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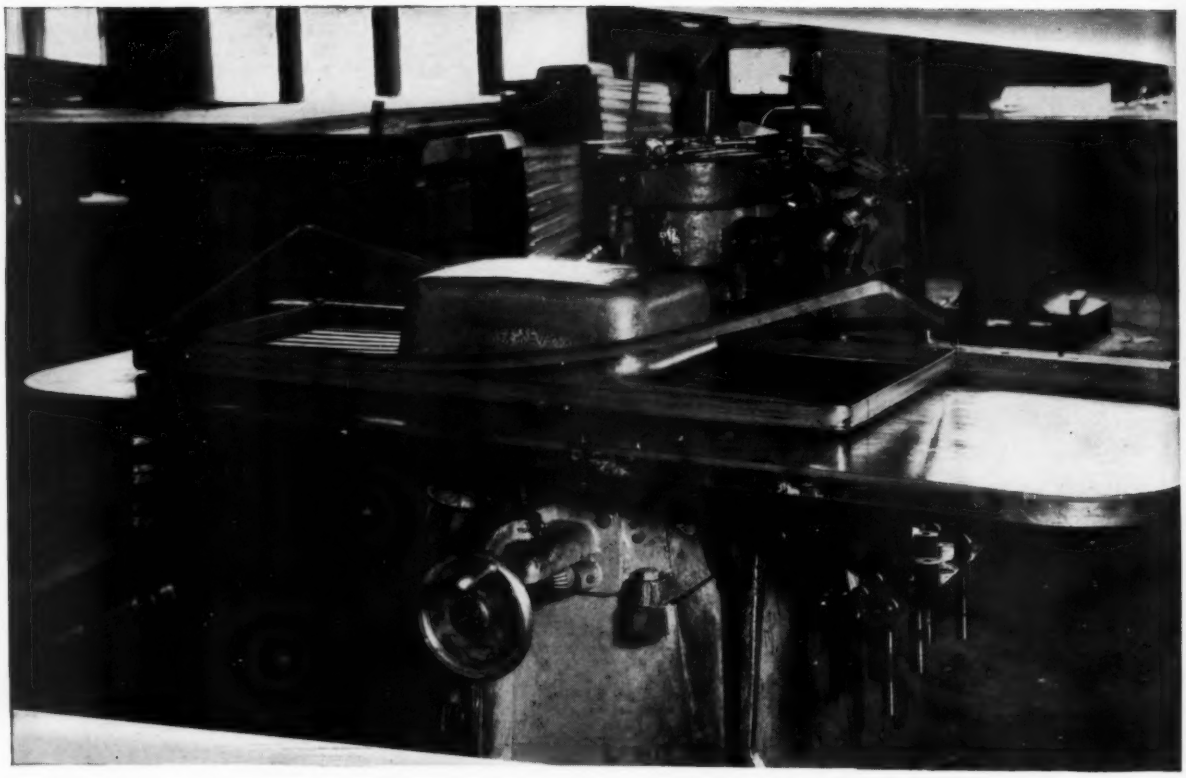

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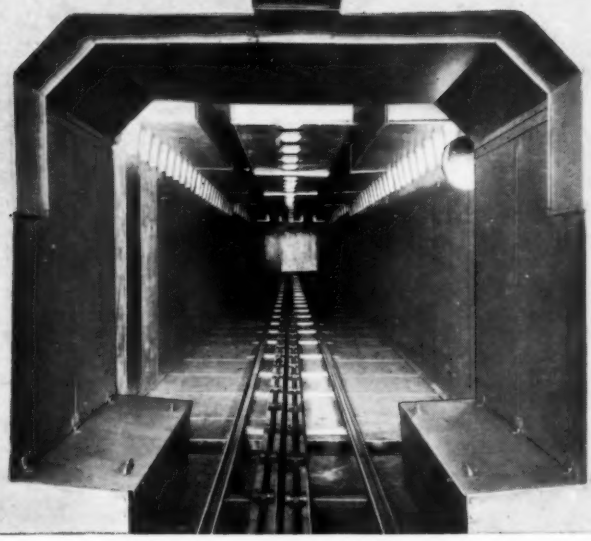

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THE Finish Line

AN UNBEATABLE TEAM of organizations, or groups of organizations, is developing along the porcelain enameling horizon. The team which we will discuss on this page covers all phases of porcelain enameling — the technical, the business, and the practical.

Comprising the team are the American Ceramic Society (technical), the Porcelain Enamel Institute (business and practical), and the local Enamelers Clubs (strictly practical). It is true that all of these organizations, with the exception of a couple of Enamelers Club groups that are in the planning stage, are not in any sense new. But, we see definite possibilities for closer cooperation between all of the various organizations, cooperating as a team to wield a stronger force than ever before — force that will be of distinct benefit to each of the organizations individually and, certainly, to the industry as a whole.

A technical clearing house

The A.C.S. has long been the established clearing house for information of a technical nature. At the 43th annual meeting, just closed, the Enamel Division offered one of its most complete programs of technical papers. The subjects covered and the material presented will have a definite bearing on the future technical development of our industry. *More power to the A.C.S.*

The problem of education

The P.E.I. includes the management of the leading suppliers to the industry — men who know the industry's problems and are in the best position to do something about them. The Institute has a sizable job to do, both in the field of educational activity and in connection with its interest in practical enameling problems. Interest in the latter activity is more than evidenced by the turnout at the annual Forum for plant men. (Next Forum — University of Illinois — early October, 1946.) The educational job is never ended, but due credit should be given for the strides that have been made to date in educational and publicity work. All we can say is, "Let's expand this activity as rapidly as possible." *More power to the P.E.I.*

The plant man has his day

Throughout the porcelain enameling industry there are hundreds upon hundreds of practical shop men who depend upon the local Enamelers Clubs for firsthand information on the problems that are important to them. Many of the key men in this group attend the annual P.E.I. Forums, and some of them — there probably will be more — belong to the Enamel Division of the A.C.S.

This still leaves an overwhelming majority of the men, those who make the wheels go round in porcelain enameling plants, who can derive great benefit both to themselves and their companies by the firsthand exchange of practical information. It is to this group that the local clubs, with their more frequent meetings, can render the greatest service. Three clubs — the Eastern District Club, meeting at Philadelphia and Baltimore; the Central District Club, meeting at Cleveland, and the Chicago District Club — are now doing an excellent job. A fourth, the Pacific Coast Enamelers Club, is to start on the West Coast (see page 48 of this issue), and at least two others are in the planning stage. *More power to the Enamelers Clubs.*

A powerful combination

With wholehearted cooperation between these effective and respected organizations, and with reasonable coordination of their activities, we have a force for advancement that can't help being felt throughout our own industry, and a competitive force that will be felt by competing industries as well.

With a President and General Secretary of the A.C.S. who know the problems of porcelain enameling, with a P.E.I. organization setup of executives and committees that is functioning smoothly, and with an increasing interest among plant men in the work of the Enamelers Clubs, we have the "right combination"—THE TEAM—*More power to the team.*

Dana Chase

EDITOR AND PUBLISHER

ERVITE has EVERYTHING to do Modern Porcelain Enameling...

Pictured above are some of the enameling operations in the Ervite Corporation plant in Erie.

Yes, the Ervite Corporation of Erie, Pennsylvania, has a brand new and, of course, up-to-the-minute plant. But that's not all — the personnel includes men whose entire lives have been spent in the enameling industry. This makes a combination hard to beat, and that's why we suggest you send your porcelain enameling problems to us for engineering study and quotations.

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The American Ceramic Society

holds 48th annual meeting

two enamel men in important society offices

THE Statler Hotel in Buffalo, New York was headquarters for the 48th annual meeting of the American Ceramic Society, April 28 through May 2. Record-breaking attendance made it necessary to call on the facilities of all leading Buffalo hotels to accommodate the visitors.

As the convention opened, 1779 members, wives and guests had been assigned to rooms in the various hotels, and many more were awaiting assignment. A.C.S. members in attendance represented every branch of the ceramic industry in the United States and Canada, and there was representation from several foreign countries.

Heavy program of technical papers

All divisions had a heavy schedule of meetings, and "standing room only" was the rule at many of the technical sessions. About 150 papers were delivered, 23 of which were for the Enamel Division. *(See "Enamel Division report" and resumés of papers in this issue of finish.)*

Charles S. Pearce, the new A.C.S. general secretary.

The business sessions of the Society divisions and the program of technical papers carried through Wednesday. In addition, a number of plant visitations were included on the program to supplement the papers and discussions.

Purdy testimonial dinner heads social events

Social highlight of the meeting was the Ross Coffin Purdy testimonial dinner held Sunday evening. At this dinner, over 500 members rose to pay tribute to the leadership of Dr. Purdy during twenty-five years as general secretary of the Society. At the close of the meeting, he was presented with a handsome purse and an order for a new car.

The annual Edward Orton, Jr., Fellow Lecture was delivered by Dr. George Clark, University of Illinois, who spoke on "Roentgen Ceramics,

President C. Forrest Teft, right, inaugurating the new officers and trustees of the Society. Left to right: L. C. Hewitt, trustee, Refractories Division; J. E. Hansen, president; John D. Sullivan, vice president; W. E. Cramer; treasurer; Theodore Lenchner, trustee, Design Division; Frank R. Porter, trustee, Enamel Division.

finishfoto

ROSS COFFIN PURDY — Ceramic student, ceramic technologist, ceramic teacher, ceramic researcher, ceramic author, ceramic editor, ceramic businessman, ceramic consultant, ceramic organizer — known for fifty years as a bulwark of the growing and developing ceramic industry. For twenty-five years general secretary and editor, American Ceramic Society.

Dr. Purdy — Fellow and Honorary Life Member, American Ceramic Society; Honorary Member, Canadian Ceramic Society; Honorary Member, Czechoslovak Ceramic Society; Honorary Life Member, Ohio Ceramic Industries Association; Honorary Member, United States Potters Association; Honorary Fellow, Society of Glass Technology; Honorary Member, Keramos; recipient of industrial awards, Homer Laughlin China Company and A. H. Heisey Glass Company; Member, Rice Leaders of the World Association; Trustee and Treasurer, Edward Orton, Junior, Ceramic Foundation; Honorary Member, Indian Ceramic Society; Member, Sigma Xi; recognized in Who's Who.

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Past, Present and Future," including an extensive account of the use of X-Ray in research in ceramics. The lecture commemorated the 50th anniversary of the discovery of X-Rays by Dr. Roentgen.

Ten permanent members of the ceramic profession were elevated to the grade of Fellow at the Sunday evening meeting. Entertainment for the evening was provided by the Guido Chorus of Buffalo who sang with Gertrude Lutzi as soloist.

On Tuesday evening the local committee gave an entertainment for the membership and presented an elaborate floor show in the main ball room of the Statler. More than 1,000 persons were in attendance. Dancing was enjoyed until one o'clock, with a broadcast on a national hookup at midnight.

The entire meeting had a high degree of news coverage, and many of the high spots were given photographic and editorial coverage in local papers.

Enamel man to head A.C.S. for 1946-47

J. E. Hansen, director of service, Ferro Enamel Corporation, was inaugurated as president for 1946-47. He is well known in the porcelain enameling industry with which he has been associated for the past 28 years. His first work in the industry was at Benjamin Electric Manufacturing Company in 1918.

"Ed" is a graduate in chemistry from the University of Illinois in 1920, and spent six years at Mellon Institute of Industrial Research on development work in porcelain enamels. He joined the Ferro organization in 1926, and became director of service in 1935. He designed and built a plant for the production of powdered metals for war use, and operated this plant during the war. He is now back as head of service work for the Ferro organization in Cleveland.

The new president is well known for his work in training men for supervision in enameling plants. His "Short Course for Porcelain Enamelers" has been attended by many operating men of the industry. He has written numerous articles, is editor of the "Enamelist," and author of three books on porcelain enameling — the latest, "The Manual of Porcelain Enameling."

"Ed" is a Fellow of the American Ceramic Society and served as trustee from 1940 to 1943, vice president in the year 1945-46, and has also served as a trustee of the Porcelain Enamel Institute.

In commenting on the prospects for porcelain enamel, the new president pointed to the very large industry, almost completely new since World

A small section of the banquet room showing A.C.S. members in attendance at the Purdy Testimonial Dinner.

War I, producing household appliances finished with porcelain enamel. He predicted the building industry would absorb a large part of the enamel production in the housing boom which is in the making. He also pointed to the great enamel plant expansion in the last year to meet the growing demand for new and better stoves, refrigerators, sinks and bath rooms.

Former P.E.I. director elected general secretary

Charles S. Pearce, formerly managing director and secretary of the Porcelain Enamel Institute and for the past two years associate secretary of the A.C.S., was elected general secretary.

"Charlie," as he is known to most enamelers, is a graduate of Ohio State University and has been connected with the porcelain enameling industry for many years. Although his new work as secretary of the A.C.S. carries far broader responsibilities in the entire field of ceramics, it is to be expected that his knowledge of, and close contacts with, the Enamel Division will be of great benefit to the Division as well as to the Society as a whole.

In commenting, he said that the American ceramic industry is enjoying one of its most prosperous periods, and called attention to the fact that a thousand members of technical and engineering branches of the industry have joined the Society in the past few years.

"Charlie" is especially interested in assisting the returned service men who are desirous of obtaining responsible positions in ceramics.

Other officers elected are John D. Sullivan, assistant to the director of Battelle Memorial Institute, vice president, and W. Edward Cramer, president of Industrial Ceramic Products, Inc., treasurer.

Mr. Sullivan has served as chairman of the committee on publications and as a trustee of the A.C.S. as well as treasurer. He has also served on committees for the American Society of Testing Materials, the Electrochemical Society, and the American Foundryman's Association. He is a member of these Societies as well as other technical groups.

In his comments, Mr. Sullivan said that industrial research is beginning to make itself felt in the reconverted American industry and referred to remarkable progress of research during the war. He stressed that equally great developments would be made in the time of peace.

Mr. Cramer was chairman of the Central Ohio Section of The American Ceramic Society during 1945 and at the present time is serving as

Don Schreckengost receiving the Binns Medal for outstanding achievement in ceramic design from Prof. C. M. Harder following the President's Reception, Sunday evening, April 28. The Binns Medal was established by the students of the late Professor Binns, who was Dean of Alfred University College of Ceramics. Professor Binns was also secretary of the American Ceramic Society from 1917 to 1921.

finishfoto

F. D. Bowman introducing the Guido Chorus at the Sunday Evening Musicale, attended by several hundred ceramists.

Councillor. He is also a member of the Institute of Ceramic Engineers, an affiliate of the A.C.S.

In his comments, Mr. Cramer stressed the solid financial standing of the entire ceramic industry. He showed that every branch of the industry is now in exceptionally sound financial condition.

Production with freedom

By EDWARD T. CHEYFITZ

Industrial relations is our number one domestic problem. Upon its successful solution hinges such issues as sustained high level employment, production, purchasing power and other vital economic problems. Unless we arrive at a Labor-Management understanding we can not proceed to solve any other economic problems facing America.

What is the solution of our Labor-Management situation? Some people suggest "curbs." They feel that legislation will solve the problem. At best, legislation is negative, and in this day, when all of us are striving for less government in our economic affairs, the proposal for more government is not too sound. There are other people who suggest that what is needed is Labor-Management cooperation; that if men of good-will sit around a table they can solve their problems. Cooperation in and of itself solves nothing. Are we to have cooperation in a vacuum? Cooperation must always be around certain principles and for certain objectives, although both might be useful to implement principles and objectives.

To seek the proper solution, let us attempt an analysis of industrial relations history. Industrial strife is not contemporary. We had strife as far back as 1786. Actually, America's most intensive class struggles were fought from 1872 to 1932. I term that "America's Sixty Years War." It was a war fought on the issue of whether Unions should become a permanent part of our workshop. It was a fight for industrial democracy — industrial freedom — economic citizenship. That Sixty Years War ended with a peace treaty, The Wagner Act of 1935.

The Wagner Act, like all peace treaties, ended the war but did not blueprint relationships for the duration of the peace. So America today finds itself in the position of having democracy in the workshop as its declared principle, but with no code of conduct to determine relationships of Labor and Management in their daily work. America faces an economic 1776. We seek the patterns of democratic living on the economic front. We seek the basis for successful industrial self-government.

We know enough about human nature and political history to know that self-rule has always been a slow, painful and discouraging process. But, for all its relative sluggishness and inefficiency, it has two long-term virtues. It educates those who practice it. It tends to permanence and growth because its policies and rules are self-imposed. We need a National industrial relations policy based upon the concept of democratic living in industry. Sound policy is always based upon principle. Let us examine the forces that operate in our workshop. While I do not discount man's drive for more and more wages, more and more of the material things, I emphasize man's drive for individual freedom and personality expression. That is a basic motivation for Unionization. The other basic force in the factory is management's drive for production. This encompasses the profit motive.

Our national policy on industrial relations, therefore, based upon these two motivating forces, calls for the acceptance of three principles.

1. Accept the Union and collective bargaining.
2. Accept Management's right to manage.
3. Accept production.

I call this national policy based upon the three principles, Production with Freedom, and offer it as the compass in our present industrial wilderness of emotions and prejudices. By this compass we may steer our course. With this yardstick we can solve the daily industrial relations problems. Against this background we can derive the successful patterns for democratic living in the workshop.

"Good heavens, Mr. Smith! Is the enameling business that GOOD or that BAD?"

Problems in the porcelain enamel sign field

From a notebook that includes data on manufacturing, pricing, installation and merchandising problems

By Paul R. Fritsch . THE GOODYEAR TIRE AND RUBBER COMPANY, AKRON, OHIO

finish These are some random observations which I have accumulated as a result of constant contact with a number of porcelain enamel manufacturers and with sign manufacturers in general, supplemented by the extensive work we have been doing in the field in all forms of identification since last August.

In 1945 we began to make extensive studies of the job which we would face in 1946, and presented here are the more pertinent conclusions.

The problem of a five year backlog

There was considerable evidence that in 1946 we would have to begin to catch up on a backlog of nearly five years of work which includes covering what was not accomplished from 1942 to 1945 inclusive, and the work that would normally have to be done in 1946. On top of that is the fact that in 1941 we did not accomplish a normal year of work because materials were already scarce then, and the manpower situation was tight because of defense work and the draft. All across the board, in every type of identification, this five year backlog constantly proved out.

To prove our own conclusions we took certain field measurements, and the one on electric signs was particularly important. We asked our field organization to indicate the number of electric signs that were absolutely necessary, either as new units or as replacement of obsolete equipment. They were not to include cases where a sign might be desirable, but only the rock-bottom cases where the sign was absolutely essential. The final figures showed again the presence of the five-year backlog because the totals were roughly five times the annual usage of signs in the years 1939 to 1941.

A 500% demand and a 65% capacity

Our own estimates indicated that in the porcelain enamel field, for example, we would have access to about 65% of prewar production capacity. Therefore, it became evident that we had a 500% volume job to match against 65% of prewar production capacity. The most alarming thing about this conclusion was the fact that our dealers were not going to be in any position to wait over a three or four year period because identification is a first fundamental in any retail business, and the need for it exists the precise moment that merchandise has to be sold.

As I have said many times before, the dealer has to have identification regardless of whether he needs or uses any other form of advertising. In our distribution picture there are thousands of dealers who use identification exclusively and who do not see the need for any other form of advertising. They depend upon the local traffic which passes their door for their store traffic, and identification is the single economical means of accomplishing this job.

A serious installation problem

We recognize that even if we could get the production of all the materials we needed, this would not mean anything unless field facilities for installation were capable of handling this amount of volume. Field experience we have in the handling of our storefront work would definitely indicate that sign erectors and other crafts involved are by no means at the point where they can absorb five times a normal volume. Therefore, looking facts straight in the face, we came to the conclusion that our *sign production requirements should be based on what we can digest and actually put to use in 1946, and that our activity must be based on taking care of the important layer of dealers first.*

In general, we are working on the basis that we will accomplish in 1946 a minimum of 65% of a normal year, and a maximum of 100%.

A crated sign offers no identification

We are exploiting another source for flat porcelain signs — namely, those signs now in the field and not being properly used.

We have a record of all the shipments we made during the war period out of 1941 inventory, and it amounts to several thousand porcelain enameled signs. Field checks we have made indicate that nearly 75% of these signs are not in use, another 20% are not being effectively used, which leaves a thin layer representing 5% of effective identification stemming from the signs we shipped out during the war. In other words, we shipped out 100 signs to get 5 in effective use.

This is not a new experience, and it is not necessarily confined to wartime conditions. In the ten years before the war we learned that identification is not achieved by the shipment of a sign, and that installation must be faced squarely as a component part of a complete identification job.

Anybody who does not face the installation problem squarely is only kidding himself, because in theory he is getting by for only the price of the sign. In actual fact, he is only wasting the price of the sign because

Porcelain enameled signs, properly maintained, are the answer to permanent identification for sales outlets.

a sign in a crate, or a sign in a junk pile is not identification. Using a rough gauge for non-illuminated signs, it costs about as much to actually place the sign as it does to manufacture it. If a sign costs $5.00 you can just about figure that it will cost $5.00 to install it. By avoiding the installation obligation, and theoretically saving $5.00, the true facts are that the original investment of $5.00 in the sign is wasted. At any rate, the installation facilities were not available during the war when the signs were shipped out.

Now we are making several types of efforts to tap this inventory by recovering the signs. The net of it is that there must be frugal use of new sign production and systematic search for identification already in the field not in use.

Have low sign prices affected future production possibilities?

I ran across one comment in the manufacturing field, and that was to the effect that porcelain enamel buyers were now paying a penalty for their buying practices before the war. In short, they were buying at prices that were at such levels that the manufacturer did not make out, hence did not have the capital to keep plant and equipment modern. Further, there is not the incentive today to modernize plants for sign work, nor is there an incentive to establish any new plants for this type of work.

I take exception to this sort of feeling in so far as my company is concerned, because our buying policies were never along this line. The general buying procedure is to deal with like companies, manufacturers who are competing on equal levels in so far as quality, financial stability and other service features are concerned.

Secondly, we have found real economy in staying with high caliber organizations and working closely with them on problems which occur on both sides of the fence. For example, our flat porcelain signs were almost invariably bought on the basis of our requirements six months to twelve months in advance. New production poured into our warehouses at one end, and our outgoing shipments went out the other end — and in the middle there was always a healthy inventory. Therefore, we did not place upon any manufacturer the burden of producing in an abnormally short time — they had the opportunity to produce on a fairly normal,

A porcelain enamel exterior provides distinctive identification for this Kansas City, Mo., Goodyear dealer. White on a blue base and two-color, 30", free-standing letters are employed by the architect.

even-flow basis and to fill in where there would be normally low production levels.

Buying and shipping practices may influence sign prices

It is purely habit on the part of some sign users to place big orders in January after they have their new budgets. As a general rule, we place very little business in this first quarter because the material we were using for the first six months of a year was already in our warehouses.

Years ago we abolished the practice of individually crating signs and making individual spot shipments to dealers. The individual shipment practice also meant that manufacturers had to warehouse signs for long periods of time, and probably did not get paid for the signs until they were shipped. There were certain expenses involved, such as the handling of individual invoices and individual freight charges. Most of our purchases were made in bulk lots, with bulk crating of five signs to a crate, and with carload shipments going out of the plant when quantities equal to a car shipment were finished. These practices obviously reduced the manufacturing costs so they were not just price reductions for the sake of reductions; they were economies which the manufacturer could make and a portion of which the customer was entitled to.

Of course, this method of doing business was only possible by our ability to forecast from twelve to twenty-four months in advance what we were going to use, and because over a period of years our identification programs were fairly constant — they did not go up and down violently.

Now I do not doubt but what there were customers who used their sharp knives on prices, but, on the other hand, isn't the consumer always operating along that line? It seems to me that even with the so-called "bad offenders" in the consumer group the responsibility still lies with the sign manufacturer. Isn't all this a part of free enterprise. It seems to me that as long as manufacturers operate on the basis of supplying just what the

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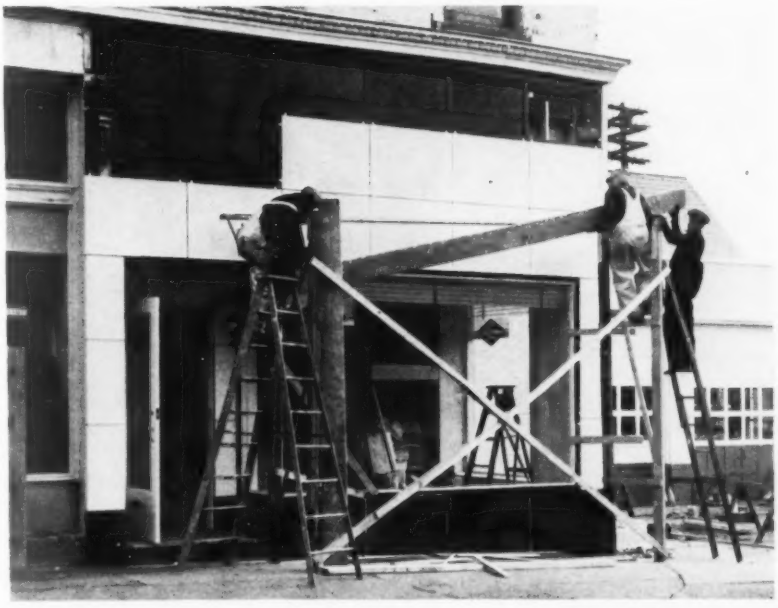
Top photo shows Goodyear dealer's store at Mansfield, Ohio, badly in need of modernization.

Center: The face-lifting operation, using architectural porcelain enamel.

Bottom: The new store front will attract many additional customers.



ENGLAND *is represented in this photograph by A. J. Biddulph, service manager for Ferro Enamels Limited.*

Representatives from other countries add international atmosphere to the A. C. S. Convention

AN international atmosphere prevailed at some of the sessions at the Buffalo meeting of the American Ceramic Society as a result of the attendance of a number of ceramic industry representatives from other countries. The *finishfoto* photographer prevailed upon a few of those present to permit a photographic recording of their presence.

Among those present from Canada, we saw our friends Fred Simpson and Austin Kelly, Guelph Stove Co. Ltd., Guelph, Ont.

From England, we met A. J. Biddulph, service manager, Ferro Enamels Limited.

Representatives from India included Messrs. Rabindar Singh, Satyapal Varma, B.A.S. Khan and R. N. Agashe. *(See "Visitor from India," April, 1946, finish.)*

INDIA *is represented by Rabindar Singh, a native of Punjab, who is in this country to study ceramics at Alfred University.*

China was well represented by a group who formed what might be termed the "Chinese Section of the American Ceramic Society."

These men are active with educational institutions, manufacturers in the United States, and Chinese Government commissions. Three of the group—Messrs. Tai Chen, P. K. Chu and C. C. Tan—are associated with the National Resources Commission of the Chinese Government.

CHINA *had 8 representatives before the finishfoto camera. They are, left to right: Tai Chen, M.S.; P. Wm. Lee, M.Sc.; Meng Chang Ting; Lt. Hsi-Chih Li; Lien-Pao Liu; P. K. Chu; C. C. Tan; and K. H. Sun, Ph.D.*

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Dry process enameling practice

a three part article containing elementary information on the manufacture and application of dry process enamels and suggestions for the control of processing defects

By W. J. Baldwin • TITANIUM ALLOY MFG. CO., NIAGARA FALLS, N. Y.

PART 2 • Milling and Enameling Operations

Exclusive feature finish

The milling of the enamel powder is an important step and many defects noted in dry process enameling can be attributed to the milling operations.

It is essential that the mill lining, whether it be in a continuous mill or a batch mill, be in good condition. Worn sections should be replaced and if "grooving" has resulted due to the action of the pebbles, this should be remedied. Wearing down of the lining will ultimately result in a difference in the grinding and the fineness of the enamel powder; making it more economical to renew the lining. The lining of the cover should be such that when in place no exposed iron is in contact with the pebbles. The speed of the mill should be kept within the specifications of the manufacturer to obtain best milling results.

In one instance a continuous mill, after being relined, would not produce enamel powder within the screen limits desired. Before relining, the powder as discharged showed a screen test of 20-25 per cent on a 150 mesh screen, but after relining, the screen test could not be raised above 10-12 per cent, and this enamel powder was not satisfactory for dusting, being too fine to handle by the enamelers. It was finally adjusted by reducing the speed of the mill, whereupon the screen test again showed 20-25 per cent residue on a 150 mesh screen. The original speed of 29 R.P.M. had been satisfactory for the worn lining, but with the new lining it was necessary to reduce the speed to 25 R.P.M.

The weight of the pebble charge should be kept constant by periodic addition of pebbles to replace the weight lost in grinding. With the batch type of mill, the loss in weight of pebbles can be determined by weighing the pebbles before and after a definite number of millings, the average loss in weight then being added after each milling. With continuous milling, the amount of pebbles to be added will depend upon data obtained in the operation of the mill. The size of the pebbles should be kept to a definite size and periodically all of the smaller pebbles should be removed. The smallest size pebble allowable will, of course, vary with the size of the mill and, therefore, is left to the discretion of the mill room foreman. Broken or flattened pebbles should be removed as these may cause defects in the enamel powder.

Charging the mill

As mentioned previously, the frit used for charging the mills should be from definite smelts so that in case of trouble with the enamel powder, a check can be made as to possible causes. With dry milling it has been found that a slight addition of water to the mill, approximately 1/10%, will prevent the packing of the enamel powder to the mill lining and results in a powder that is more easily handled by the enameler.

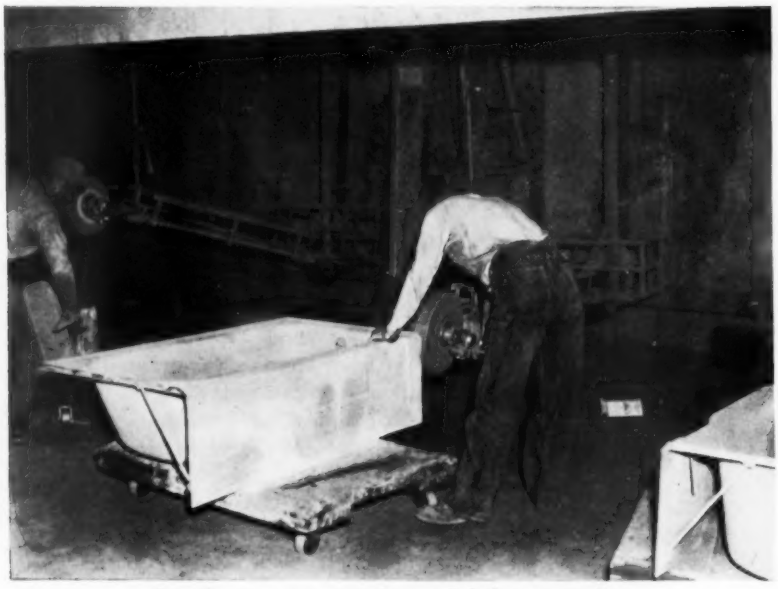
In continuous milling a vibrating feed hopper is generally used. In some instances a larger hopper is used which, when filled, holds sufficient frit for 24 hours or more operation of the mill. Such a large hopper is not recommended because if trouble develops with the enamel powder, the entire lot of frit in the hopper is in question. With a smaller hopper, which holds sufficient frit for two hours or so operation, greater control can be exercised in the milled powder in case of trouble.

With the continuous mill a check is made every half hour on the fineness of the enamel powder and at least every hour a test is also made on the finish obtained with the powder produced by enameling some production item.

Colored enamel powders, which, incidentally, can be a considerable headache in any shop, are produced in batch type mills. The colored enamel powders are milled considerably finer than the white enamel in order that the enamel, when fired, will not have a mottled appearance. The selection of the oxides used should be based on their stability, e.i., their ability to produce uniform color under the various firing conditions encountered in processing the various types of ware. To insure a uniform color match at all times the frit used for colored powder should be as uniform in reflectivity as possible. It is usually customary to adjust each mill of colored enamel powder after grinding by further additions of color oxides or opacifier, but if uniform frit is used, this practice should not be necessary.

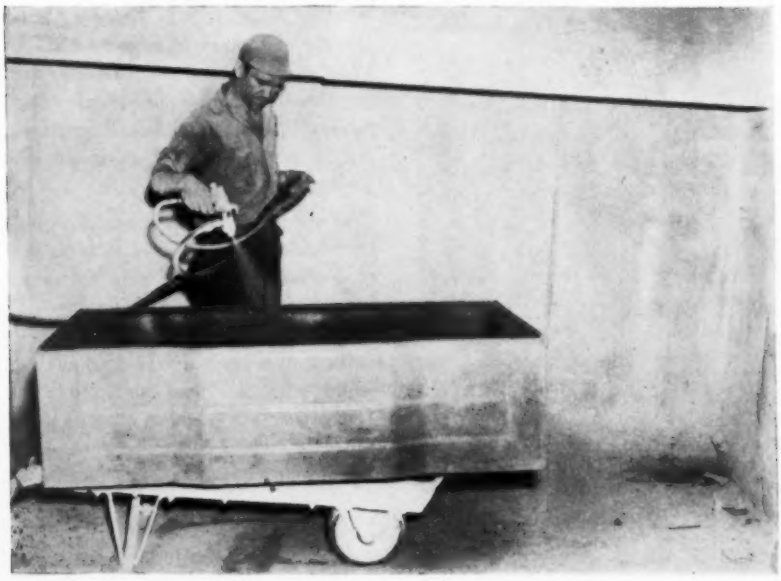
In most enameling shops, keeping the regular powder separate from the acid resisting powder is a problem. In the wet process enameling industry, this problem has been solved by milling an organic dye such as methyl violet with the acid resisting frit. The percentage of such dye used is approximately 1/400 per cent, and this imparts to the milled enamel a

The rough casting as it comes from the mold.



Rough spots are ground smooth before enameling.

The ground coat is sprayed on the finished casting.



light pink color. The same method can be used with dry process enamels very satisfactorily. In batch milling a weight of methyl violet equal to 1/400 per cent of the frit weight is added to the mill. With continuous milling, the dye may be fed on the vibrator feeder along with the frit or can be added in solution form.

This method of dyeing the acid resistant powder not only has the advantage of distinguishing it from the regular enamel powder when stored, awaiting shipment to the enameling department, but also permits easy identification of the reclaim powder. The use of such a dye in no way interferes with the enameling, but is an aid to the enameler. As the dyed powder hits the hot casting, the color disappears until a fairly heavy coat is applied at which point the fading is not so pronounced. On firing, the color disappears entirely and the dye does not in any way affect the finish of the fired enamel.

Four necessary steps in dry process enameling

Various means have been described for obtaining a clean and uniform enamel powder. Certain steps in the actual enameling operations deserve consideration. These are discussed under the following headings:

1. Inspection of finished raw castings.
2. Application of ground coat.
3. Application of powder or enameling of the ware, and
4. Inspection.

Inspection of finished raw castings

The castings as they are received from the sandblast are carefully inpected before the ground coat is applied. Any evidence of roughness of the casting, or iron knots, is removed. All holes in the castings not over 1/8" in diameter are plugged with suitable plugging compound. Those castings that have large blow holes too large for plugging are returned to the repair department, and such holes are repaired by welding. It is essential in this welding operation that the rod used correspond in chemical analysis closely to the iron itself, since any dissimilarity between the

iron and the welded portion will lead to possible defects after enameling, mainly in the form of "lifts."

In the handling of the castings during inspection, cotton gloves should be worn by the inspectors. This precaution is taken to prevent perspiration from the inspectors' hands coming in contact with the sandblasted casting, since the salt deposit may cause defects in the fired ground coat which, in turn, may affect the cover coat when fired. The inspected castings should be coated with the ground coat without delay; but if this is not possible, such castings should be kept in a warm, dry room.

Application of ground coat

The ground coat application is a particularly important process. The ground coat should be closely controlled for fineness and specific gravity; such control being done in the mill room. Controls on the fineness of the milled enamel, the specific gravity, and flow of the enamel slip should not be based upon certain recommendations, but rather upon the results obtained under actual shop conditions. It is often good policy to let the sprayers decide when an enamel sprays properly and if the results of fired trials corroborate their judgment, the controls set up for that enamel should be maintained.

A fineness test of 3-4 per cent residue on a 200 mesh screen, with the enamel set to have a specific gravity of 1.60 - 1.64 and a flow time of 18-20 seconds for 100 cc of the enamel, using a standard viscometer, are controls that worked satisfactorily for one ground coat. Variations in the type of mill additions used and the frit itself must be given consideration, and no set control can be given that will work under all conditions.

The casting after the ground coat is applied should be dried and placed where it will be accessible for delivery to the furnace for enameling. In most dry process plants, storage is a major problem and placing of the ground coated ware prior to firing and enameling should be given consideration, not only from a handling standpoint but also from a viewpoint

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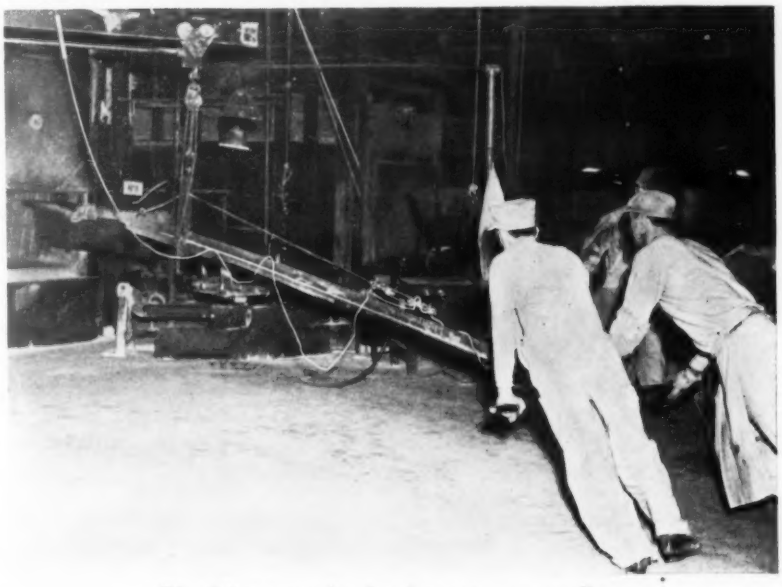
Enamel powder is sifted onto the red hot casting.



The firing operation for dry process enameling.

The finished ware receives a critical inspection.

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Enamel division program

A. C. S. forty-eighth annual meeting

with authors' resumes and abstracts of division papers

UNDER the capable direction of Enamel Division Chairman W. W. Higgins, A. O. Smith Corporation; Program Committee Chairman Clark Hutchinson, Ingram-Richardson Manufacturing Company (Frankfort); and Secretary D. G. Moore, National Bureau of Standards, the Enamel Division Program for the Forty-Eighth Annual Meeting was inaugurated Tuesday, April 30, 1946.

In the order of new business, the following officers were elected to serve for the coming year: Clark Hutchinson, section chairman; J. J. Canfield, American Rolling Mill Company, vice chairman; F. R. Porter, Inland Steel Corporation, Enamel Division trustee; and D. G. Moore, re-elected secretary.

Each meeting of the program, which extended from Tuesday forenoon thru Wednesday, boasted of excellent near-capacity attendance. The many papers presented covered a wide variety of subjects and problems in the porcelain enamel industry. Unfortunately, because of limited time and an unusually full program consisting of twenty-four papers, the discussion period following each presentation was curtailed.

Careful study, research, and long work bore fruit in the production of valuable and interesting papers to the practical enameler and the student of enameling. A wealth of information was contained in papers chosen at random concerning shop problems as factors effecting fractures and orange peel, metal handling, cleaning versus surface preparation of metal, adherence characteristics of porcelain enamel to ferrous metals, etc.

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New officers for the coming year are Clark Hutchinson, section chairman; F. R. Porter, Enamel Division trustee; J. J. Canfield, vice chairman; and D. G. Moore, re-elected secretary.

The results of research were offered in papers such as the effect of the coefficient of expansion of ground and cover coat enamels on impact and thermal shock resistance and other papers of similar projects.

The comparatively new work in the properties of titanium enameling iron and its fabricating and enameling performance were subjects of papers as were testing developments and ceramic coating for high temperature protection of steel.

Testing and specifications came to the foreground again this year with a number of papers combining to provide a thorough coverage of the subject. Pointing to the future were papers pertaining to modern plant-layout and equipment and the demand for new colors and designs for post-war porcelain enamel.

Handling of metal prior to application of porcelain enamel

By D. J. BENOLIEL AND W. J. HARING

The proper preparation of a metal surface for porcelain enameling is best understood in the light of the basic physics of chemistry of surfaces. The forces which hold soil on a metal surface are a result of a specific soil and the basic qualities of the surface itself. Absorptive forces continue after cleaning; hence, materials other than steel are on the metal surface after it has been cleaned. The relationship of these residues to subsequent operations determines whether or not we may describe the surface as being properly

prepared for a porcelain enamel coating.

Preparation for such a coating can best be accomplished by treating steel at all points from the melt to where it finally is put into a cleaner tank. In this way, one can be guided on the choice of the proper chemical combination to properly prepare the surface. So called "cleaning" usually substitutes a film that is compatible with the subsequent process for one that is incompatible. Thus, the authors are studying the possibility of using chemicals for cleaning which leave residues that are definitely desirable to a porcelain enamel coating.

Nickel flashing and its relation to enamel adherence

By EUGENE WAINER & W. J. BALDWIN

Nickel flashing is shown to be primarily metallic Ni. The role of Ni in promoting adherence apparently is bound up with retarding oxidation. Adherence may be considered a corrosion phenomenon of the base iron developed by the action of gases and other agents which may be present. As such, the degree of adherence is a function of pressure at the interface when the glass is fused. The equilibria developed are strongly affected by the presence of Ni. With cover coats directly on iron, the amount of Ni required will vary with the enamel compound. The adherence-promoting oxide for sheet steel seems to be FeO at enameling temperatures; the FeO is formed under certain equilibrium conditions which are obtained through the presence or formation of a material, probably a metal from the group of materials known as adherence promoters, which acts as a stabilizer for, and the continued development of, FeO. The bond at room temperature consists of a mixture of the stabilizer material (probably metal), metallic Fe, and Fe_3O_4, the last two resulting from the decomposition of FeO on cooling; an alloy of Fe and the stabilizing metal may form. The adherence promoters must meet certain equilibrium conditions to be effective, and they may operate singly or in combination. In the bond, Fe_2O_3 alone or in combination with the other oxides, or Fe_3O_4, in the absence of metal, does not develop adherence; they may develop adherence, however, if such conditions exist at enameling temperature; and adherence will certainly develop if the room-temperature conditions indicate their presence.

Nickel dipping

By G. H. MCINTYRE

Experimental investigations and production experience have shown that the oxidation of iron salts which form on the surface of the metal both prior to and subsequent to the nickel flash are detrimental to the enamel coating. When proper steps are taken to prevent the oxidation of these salts, to remove the unoxidized salts, and to secure the proper amount of nickel on the surface of the steel; the nickel flash treatment is extremely beneficial and should be used in every well controlled enamel shop.

Also in the operation of both the nickel flash tank and the neutralizer tank, it is essential to prevent the build up of sludge. In both cases this can be removed by continuous filtering steps. A non-ferrous filter system for the nickel tank and a ferrous system for the cleaner tank are satisfactory. The continuous filter should be of sufficient capacity to treat the entire volume of the nickel tank at least once every four hours.

It has been shown that a weak sulfuric acid rinse between the acid and the nickel dip tank is effective in preventing the oxidation of iron salts

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previous to the nickel treatment. The iron salts which form during the nickel treatment are excessive and to prevent their oxidation it has been found effective to eliminate the rinse between the nickel flash treatment and the neutralizing treatment. In such cases it is good practice to use two neutralizing tanks, carrying a slightly stronger solution in the first tank. A cyanide neutralizer is recommended but it should be used in conjunction with sodium hydroxide. Under such conditions, it is perfectly safe.

If it is felt that a rinse is necessary after the nickel flash, it should be kept acid at a pH of about 3.0 to 3.5 and the time of exposure to the air between immersion in the various solutions should be kept as short as possible. A cold rinse should be used.

The nickel tank operates best at a concentration of about one ounce single nickel salts per gallon, and at a pH of about 3.0 to 3.5. The pH should be controlled by additions of sodium hydroxide and sulfuric acid. A boric acid buffer and ammonium carbonate additions should be avoided as these increase the tendency to form iron salts which oxidize to cause blistering, brown specking, and similar enamel imperfections.

Recommended practices are as follows:

1. After the acid pickle — five minute rinse in sulphuric acid of pH 3.0 - 3.5 at room temperature. .
2. Nickel Dip — Time is variable to suit plant conditions. Solution should contain ¾ to 1½ oz., preferably 1 oz. single

nickel salts per gallon. Maintain acidity at pH 3.0 - 3.5 with addition of sulphuric acid or sodium hydroxide. Do not use boric acid as a buffer as this promotes excessive formation of complex iron salts. Temperature of the bath should be 155° F.

3. Do not use a rinse, but, if it is felt absolutely necessary, a short rinse in sulphuric acid of pH 3.0 - 3.5 is effective. The time interval between the nickel flash and the rinse as well as the rinse and the neutralizer should be extremely short.

4. Two neutralizer tanks should be available, the first made up in fairly strong solution and the second weaker. Suggested conditions are:

a. 0.4 oz./gal. sodium cyanide
0.2 oz./gal. sodium hydroxide
Temperature 140° F.
Time 1½ min. immersion

b. 0.12 oz./gal. sodium cyanide
0.10 oz./gal. sodium hydroxide
Temperature 140° F.
Time 2½ min. immersion

Carbonates should be avoided in the neutralizer since these have been found to hinder the cyanide removal of the ferrous salts.

There is no question that a properly controlled nickel flash treatment has many advantages for blue ground coat application and is an absolute necessity for the successful application of white directly to the steel.

Some factors governing the adherence of enamels applied to sheet iron

By L. A. Johnson and E. E. Howe

A series of tests were conducted to ascertain the effect of nickel deposition and firing variations upon the adherence of enamels applied to special enameling sheets. In this study, two special steels were selected due to their demonstrated ability to be successfully enameled with white cover coats applied directly to the metal. Three enamels — a commercial blue ground coat, a zirconium opacified white, and an antimony-molybdenum white — were used.

The adherence was investigated from the standpoint of steel, enamel and firing variations. The results of these experiments may be summarized as follows:

1. The commercial blue ground coat adhered uniformly well to both steels over firing range investigated.

E. E. Howe

2. The zirconium opacified enamel gave fair adherence on special Steel No. 2, but failed on Steel No. 1.

3. On Steel No. 1, the antimony-molybdenum enamel displayed a wider adherence range than on Steel No. 2.

4. Where adherence developed, the steel-enamel interface of all three enamels were similar.

5. The zirconium opacified enamel did not display a "hazy layer" which is characteristic to the cobalt-nickel ground coat and the antimony-molybdenum white enamel.

6. Oxidation rate of Steel No. 1 was found to be greater than Steel No. 2 at firing temperature.

7. The zirconium opacified enamel exhibited a lesser ability to dissolve iron oxide than either the cobalt-nickel ground coat or the antimony-molybdenum enamel.

Porcelain enameling characteristics of some common ferrous metals

By W. A. Deringer

The enameling behavior and the behavior of hydrogen in seven different ferrous base metals were studied.

The experimental evidence indicates that the behavior of hydrogen in a metal is a prime factor in governing the porcelain enameling behavior of that metal. Furthermore, it is believed that the all-important property of the metal which governs its hydrogen behavior is the rate of diffusion of this gas through it. Any alloying element which can be added to the steel to decrease this rate of diffusion will improve its enameling properties. Titanium has this property to a limited extent and chromium to a greater extent, but it takes considerably more of the chromium to give this beneficial effect. However, the limited extent to which the titanium addition decreases the diffusibility of the hydrogen may be increased at the high temperatures encountered in the enamel firing operation.

The experimental evidence shows that the titanium-bearing enameling iron is better than regular porcelain enameling iron as far as primary boiling, reboiling and spontaneous fishscaling are concerned. All of these defects are caused ordinarily by the hydrogen originally in the base metal and that hydrogen introduced during the porcelain enamel firing. It seems reasonable that while the titanium has a limited retarding effect on the diffusibility of hydrogen when there is an unlimited supply of atomic hydrogen produced at the surface, the effect on the limited amount present in the enamel firing operation is sufficient to account for the differences in the behavior of these two steels.

It is not within the scope of this paper to determine how titanium and chromium decrease the rate of diffusion of hydrogen through steel; however, two possible ways in which these elements might affect the diffusion are suggested and are as follows:

1. The titanium and chromium may decrease the ratio of diffused to evolved hydrogen. In other words, these elements may have a poisoning or reverse catalytic effect on hydrogen diffusion.

2. The elements, titanium and chromium, may be so located in the

crystal lattice structure as to serve as plugs to prevent the diffusion of hydrogen through the lattice structure. That is to say, these substances may "plug the gaps" in the crystal lattice and, by so doing, render the metal impenetrable to atomic hydrogen diffusion.

Titanium stabilized enameling iron

By EUGENE WAINER

The enameling process is described and the various defects and presumed causes are detailed, particularly as to the role of the base iron in developing such defects.

Recognizing the argument existing as to enamel vs. base iron as being the source of such defects, the thesis is presented that in the last analysis these defects are the result of reaction between the molten glass and the compounds of iron with certain metalloids such as carbon, sulphur, nitrogen and the like. A working hypothesis on this basis is developed for all the known defects normally encountered with respect to surface in porcelain enamels.

A description of the process of manufacturing enameling iron is followed by discussion of the role of titanium in such enameling iron as a result of experimental and commercial experience. The role of titanium is shown to be primarily that of combining with the reactive metalloids in enameling iron to the extent that the reaction between base iron and glass is either eliminated or minimized sufficiently so as to be useful for enameling purposes. In this fashion the ideal of one coat white directly on iron is approached.

The manufacture of titanium stabilized enameling iron, its properties, and its value in developing a blemish-free one coat finish is indicated. The significance of the development for enamelers is pointed out.

The fabricating and enameling performance of titanium enameling steel

By FRANK R. PORTER

The type of steel under consideration is one having a minimum titanium to carbon ratio of four to one — the theoretical ratio of the combining weights of titanium and carbon to form titanium carbide.

This titanium steel has many interesting properties. Two of these are its fairly uniform coefficients of expansion from 200 to 1600° F., and its comparatively high resistance to sagging at enameling temperatures.

The steel is harder than enameling iron, which fact should be considered in setting up fabrication processes.

The results of production enameling indicates the following:

1. *Single Coat White*

A saving in cost of from 10 to 20%, plus added plant capacity of approximately 50%.

2. *Two Coats of White*

A saving in cost of about 3%, plus added plant capacity of approximately 30%.

3. *Ground Coat Plus White*

a. A cost increase of about 10%, but an increase in plant capacity of about 10% due to a decrease in reoperations.

b. The use of titanium enameling steel reduces enamel shop reoperations by from about 8% for good stove plant operation to about 20% for good job shop operation working on "tough" parts.

The cost data presented do not include any saving resulting from a decrease in assembly and field losses.

Stiffening effect of porcelain enamel on sheet iron

By DON S. WOLFORD AND GLENN E. SELBY

The stiffening effect of porcelain enamel on sheet iron has been recognized for many years. It can be quite beneficial on flat surfaces such as panels, signs, table tops, cabinets, refrigerators and stoves.

The actual magnitude of the stiffening has been determined by means of bending tests. Enameled specimens of 18 to 28 ga. flat sheet iron coated with ground coat enamel of thicknesses ranging from .004 to .025 in. and enameled, corrugated sheet iron in 18 and 20 gages were investigated.

Increases in stiffness (flexural rigidity) and bending strength (maximum safe bending moment) ranged to as high as 1500% and 500% respectively in the case of 28 ga. flat sheet iron with .025 in. of enamel per side. An enamel thickness of .009 in. per side, which is normal for some applications, increased the stiffness and strength of 28 ga. flat sheet iron about 190% and 150% respectively. The percentage increases in stiffness and strength due to enameling were considerably less in corrugated sheets than in flat specimens.

Formulas and curves are means for determining the flexural rigidity, maximum safe bending moment and weight of porcelain enameled flat sheet iron. These relations all vary with respect to a power function of the ratio between overall and base iron thicknesses. They are based on elastic and other constants which were analyzed mainly from the bending data. Formulas and curves also show the probable increases in stiffness, strength and weight of formed and porcelain enameled sections of sheet iron.

The influence of porcelain enamel on sheet iron subjected to axial loads was investigated by means of tensile and compression tests. Wire strain gages were used in these and some of the bending tests to determine the stresses at which cracking occurs. Analysis resulted in the determination of moduli of elasticity and strength in bending, tension and compression

for porcelain enamel and sheet iron.

The structural influence of porcelain enamel on sheet iron can be considerable, and as such, is of definite interest to manufacturers and users of porcelain enameled sheet iron products. It should be remembered that practice limits the thickness of enamel on thin sheets, especially on the corners of formed sections, and because of the necessity of maintaining flatness during firing.

Modern enamel plant layout and equipment

By GLENN A. HUTT AND PAUL S. GRUBER

The present day expansion and reconversion plans of all enamel plants bring to our minds the necessity of modern enamel plant layouts and up-to-date equipment. In order to meet competition, combat increased labor and material costs and meet rising standards of quality, careful consideration must be given to modern enamel plant layout and equipment.

Desirable sizes for buildings, floors, aisles and column heights are important, as is ventilation on furnaces, spray booths and pickle room areas. Types of construction, sizes and air velocities are given.

Before layout problems are tackled, consideration must be given to production per day, type of product, gauge, physical size, general design and sequence of operations. Descriptions are given of box type and continuous furnaces along with capacities and BTU consumption. Times and temperatures are described for dryers. Production figures are given on spraying and dipping methods.

The simplest and most efficient method of making a plant layout is to have the available floor plan drawn up to as large a scale as possible. This method includes techniques for determining efficient enamel plant layouts and locating equipment and banking areas for efficient production.

Types of pickle room equipment including tanks, hoisting apparatus, filter presses and dryers are discussed in detail.

Descriptions of continuous furnaces, furnace recuperators, special box type furnaces, infra-red dryers and electrostatic sprayers are outlined by the authors.

The possibilities of new color and design for postwar enamels

By H. EDWARD WINTER

In order to meet the demands of postwar needs and competition from many new products appearing on the market, the industry must take advantage of the constructive forces which have been at work during the past few years.

One of these forces is the public's increasing interest in the color and styling of objects which surround its every day life. Skilled artists, stylists, and colorists have done an exceptionally good job in their respective fields for motion pictures, fashions, home furnishings, utilitarian products, automobiles and architecture. Their creative work has developed simultaneously and the result is basically sound because it originates from our mode of life.

Industrial designers have greatly increased the salability of items in the utilitarian field; decorators have developed new sales for home furnishings. Educated by fashions and motion pictures in the fundamental theories of personalized color, women are aware of the fact that suitable colors are desirable and even necessary in their surroundings. Color consultants have worked closely with the retail market and the manufacturers to introduce a new system of color harmony for the home furnishing field. Women want beauty as well as utility; they are keen buyers, have money to spend, and are perhaps the nation's greatest retail buying power. Their standards of good taste have reached new levels, and since women are the chief purchasers of many enameled items for the home, it would be wise to take a leaf from the book of the designer and colorist in other fields to see how they attacked the problem of color.

It is now time for the enamel industry to devote more thought to improving its products for the future. Certainly the architectural field alone should offer a challenge to turn out enamels in finer colors, better textures, and more suitable designs. In many instances architectural decorations have been crudely adapted from inappropriate color patterns and stenciled by men who have had a technical knowledge of enamel but have not had the training in color and design. For the benefit of the industry at large, enamel shops in the future should seek the professional advice of those who are authorities.

Intelligent and capable research men have produced, by working together, a material that is basically sound. The industry is now in dire need of men who have the creative and artistic ability to do for the industry what the designers, stylists, and colorists have done for the fashion, home furnishing and automobile industries.

How can the industry accomplish this task? The first step might be to finance a research or design laboratory, manned by an enamel research technician, an architectural consultant, a skilled color stylist or artist. These men could function as a unit and develop new uses and new techniques in the application of enamel. Such a laboratory, while giving information and consulting service to the entire industry, would actually develop new colors and textures, offer advice in fabrication and assembly of architectural units, and show the correct types of decorations for specific building needs. These men could give an industry much advice on quality and restraint that in the past has been misguided at times. Adjoining this laboratory could be a room devoted to architectural displays; new prod-

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SNAPSHOTS AT THE

Left: Drakenfeld's Dr. Robert R. Shively, with Miss Anne Shively, at the Purdy Testimonial Dinner.

Right: United Feldspar's R. F. Sherwood, and Mrs. Sherwood, enjoying the convention.

Left: The Carborundum Company is well represented by R. A. Barr and J. P. Swentzel.

Right: Orefraction's president and general manager, Jack Hunt, relaxes between meetings.

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Left: Technical men, L. C. Hurd and Dr. A. K. Opperman, talk it over with Norman Wedemeyer. All are with Rohm and Haas.

Right: Paul A. Huppert (See October, 1945, finish), writes a letter from convention headquarters.

Left: Pemco's smiling H. G. Wolfram points out an interesting photograph in the A.C.S. exhibit to Dr. Spencer-Strong.

Right: This group includes S. S. Cole, National Lead; R. R. Danielson, Metal & Thermit; Dr. C. H. Moore, Jr., National Lead; and G. C. Betz and William Coffeen, of Metal & Thermit.

Left: Steel men congregate. They are, left to right: Rudyard Porter, Carnegie-Illinois: Fred Sutphen, of Armco; and Frank Porter, of Inland.

Right: Alfred University's president, Dr. J. E. Walters, and Mrs. Walters, photographed at the speakers' table during the Purdy banquet.

48TH ACS MEETING

Left: Titanium Alloy's K. B. Strong has his attention focused on something of interest.

Right: Frank Michael, of General Electric's chemical division, talks with C. F. Geiger, Carborundum, Perth Amboy.

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Left: Great Lakes Steel's C. W. (Connie) Given talks it over between convention sessions.

Right: These smiles come from D. S. Beal, Youngstown Sheet & Tube; W. F. Wenning, Ceramic Color & Chemical; and M. H. Whitehead, of Canton Stamping & Enameling.

Left: Harshaw Chemical men get together. They are: Lew Farrow, Harry Draker and Art Daumke.

Right: E. M. Hommel, The O. Hommel Company, takes a note as he talks with Alfred Austin, Corning Glass Works.

→ *from Page 29*

ucts could be featured, and examples shown in their proper adaptations.

A research laboratory could develop transparent enamels for sheet copper, which, combined with steel enamel in architecture, could act as jewel accents for building facades as well as store fronts. Rich forms of decoration could be discovered with luminous metallic effects, lusters, mother of pearl, combinations of liquid bright gold, matt gold, silver, and platinum. Gold leaf applied in square sheets and fused into the enamel surface, combined with either textures or high gloss enamels, would present striking forms of decoration for interiors as well as exteriors of buildings. Customers with the money are in the market for such quality products were they only offered.

Design possibilities, as proven by many artists in the field, are limitless in enamel, on both copper and steel base metals, and if such a creative research program is followed the industry need not fear competition from any other material as no other has porcelain enamel's flexibility of form, color and design. The challenge should be met by strong, intelligent and cooperative effort from every one within the industry.

The effect of the coefficient of expansion of the ground coat and cover coat enamels on the thermal shock and impact resistance of enameled ware

By F. A. Petersen and A. I. Andrews

A series of four antimony and four fluoride cover coat enamels, and four ground coat enamels, were formulated to have varying coefficients of expansion. The calculated values were 250, 275, 300 and $325X10^{-7}$; the actual expansions were determined using the interferometer.

Comparison of the calculated values and observed values for the expansion of the enamels shows that the calculated values are all low. The calculated values for the fluoride enamels, however, showed less agreement with the observed values than the other enamels studied.

The enamels were applied to standard two-quart pudding pans and tested for various properties.

The standard thermal shock test (E.U.M.C.) was used to determine the resistance of various combinations of ground and cover coat enamels to this type of failure.

Professor Andrews finishfoto

The results show that the expansion of the ground and cover coat enamels is perhaps the most important factor in controlling the thermal shock resistance of enameled ware.

A combination of high expansion ground coat and low expansion cover coat gave the best results. This was found to be true for both antimony and fluoride cover enamels.

The impact resistance of pans coated with the various cover and ground coat enamels was determined using the E.U.M.C. standard test. No conclusive evidence was found that indicated a change in impact resistance due to changes in expansion of the enamels.

The solubility resistance of all of the enamels was determined using the E.U.M.C. standard solubility test. All of the cover coats have good resistance to acid solubility, the antimony enamels having greater resistance to attack than the fluoride enamels.

This work shows that it is possible to develop enamels which have good impact, thermal shock and solubility resistance. Reflectance curves were made for the cover coat enamels.

Testing the resistance of enameled surfaces to scratching, gouging and abrasion

By F. A. Petersen

Seven types of cover coat enamels, including fluoride, titanium, antimony acid and non-acid resisting and zirconium non-acid resisting enamels were tested for resistance to physical wear by various methods. The methods used were: (1) P.E.I. abrasion test, (2) P.E.I. gouge test, (3) Variations of the gouge test, (4) Taber Abraser, and (5) Scratch test. The solubility resistance and reflectance were also determined.

The bubble structure of the enamels was studied to determine any correlation between size, distribution and number of bubbles and resistance to wear.

Pieces of the test plate coated with the test enamels were ground and polished so as to give a section diagonally through the cover coat and ground coat layers. The ground face was polished, using rouge. In this manner, the exposed bubbles were filled with rouge and were easily seen when viewed through the microscope.

It was concluded that:

1. Any test in which the force acting on the abrading or scratching mechanism is very small is a test of the resistance of the surface layer to failure.

2. The resistance of the surface layer to failure due to physical wear is a function of the enamel gloss, and the structure of this layer, i.e., presence or absence of bubbles.

3. The resistance of the body to failure is dependent upon its bubble structure.

4. The results and previous studies indicate that partial loss-of-gloss of the surface as a measure of its resistance to abrasion is questionable, unless the initial gloss of all specimens

tested is approximately the same.

5. "Ball tracking," which is a cracking of the surface during gouge testing, should be taken into consideration in evaluating gouge resistance.

6. A determination of gouge resistance can be more accurately made by using an increasing load during test than using a constant load on a series of gouge tracks.

7. Solubility resistance and the relative hardness of the crystalline phases present in the enamel frit do not seem to be controlling factors in the resistance of an enamel to surface or body failure.

8. Preliminary studies using the Taber Abraser as an instrument to measure the resistance of porcelain enamels to abrasion are very encouraging.

9. Factors other than mill additions affect the bubble structure of porcelain enamels.

This investigation is by no means a complete investigation of the factors which affect abrasion and deep scratch resistance, but the very marked effect of the bubble structure of the enamel layer has been established and some of the probable factors which affect the bubble structure have been discovered.

Ceramic coatings for high-temperature protection of steel

By W. N. Harrison, D. G. Moore and J. C. Richmond

A new type of ceramic coating for the protection of ordinary low-carbon steel at high temperature was developed during the war and was used by the Army and Navy on the exhaust systems of certain aircraft and other vehicles. The outstanding features of these coatings are: (a) extremely high resistance to failure under repeated thermal shock, (b) prolonged protection of the metal against oxidation at temperatures up to 1250° F., (c) resistance to the cracking and blistering that is produced in conventional porcelain enamels under comparable conditions of high temperature and severe thermal gradients and (d) a surface which does not give glare by producing highlights and, therefore, maintains low visibility.

The successful method of compounding the coatings is to produce a heterogeneous layer of coating through mechanical admixture of a special grade of calcined aluminum oxide with a conventional type of ground coat frit. After grinding the slip or water suspension to appropriate fineness, it is applied to the metal, dried, and fired according to well-known methods. Unlike ordinary ground coat enamels, the coatings may be (and for many uses should be) fired on low-carbon steel in an unprecedently thin application of 0.002 to 0.003 inch.

Modifications of these ceramic coatings may be formulated which closely resemble conventional glossy enamels but which in addition retain a significant degree of improved resistance to high temperatures and sudden temperature changes.

Factors affecting fracturing of porcelain enamel on sheet iron

By E. E. Bryant

The main factors affecting fracturing of porcelain enamel in production, in assembling, and in use, are assembled and used in a tabular form in an attempt to give a broader understanding of the problem. The tabular form is essentially a method of showing the inter-relationship of the various factors. The terminology used for the factors having some effect on fracturing of porcelain enamel is somewhat arbitrary. The various terms used for the factors are discussed and defined.

Design features, temperature differentials, enamel qualities and strains are among the terms defined and used in this paper. Consideration of each area or contour of a part in relation to other areas of the same part is pointed out as being of importance.

Due consideration of all the factors involved accounts for the failure to duplicate production experience with any one laboratory testing procedure. It also appears that a combination of laboratory tests will not duplicate results of production experience. It is recommended that production parts prepared under normal production conditions be used for any testing which is to be used as a measure of resistance to fracturing.

The paper was presented in an effort to broaden the understanding of the problems involved where fracturing of porcelain enamel is considered. A table of variable factors and properties directly affected should be of assistance in making a logical approach to a problem involving fracture of porcelain enamel.

An oven thermal-shock test: Observations on mechanism of failure

By J. C. Richmond and W. N. Harrison

The method of test consists essentially of heating the utensil in a thermostatically controlled oven to a predetermined temperature and quenching with ice water while in the oven. This process is repeated at successively higher temperatures. The method is appropriate for testing all sizes and shapes of utensils. Very large utensils are tested singly; medium size, two at a time; and small size, in groups of four.

The mechanism of thermal-shock failures is discussed, and some comparative tests made by the hot-plate method are reported. Graphs are presented showing the change of temperature differentials and distortion

of pan bottoms ("breathing") during heating. Photographs of failures due to thermal shock are shown, and tests are described in which quenching was omitted. The conclusion is drawn that thermal shock failures originate during the quenching operation. More often, the fractures thus started are completed and blown off in subsequent heating by steam pressure in the fissures, possibly being aided by the breathing effect.

The relation of enameling iron preparation and accessory conditions to copperhead-type defects

By W. H. Pfeiffer and R. S. Sheldon

By use of a ground coat enamel which copperheaded readily in the laboratory furnace, it was found that electrolytic caustic soda, sodium cyanide, barium hydroxide and some other materials used alone or in combination in a neutralizer solution not only prevented copperheading but that the degree of copperheading was in direct proportion to the amount of straw, yellow or brown color on the surface of the iron from sulfuric acid pickling. Sodium cyanide was added to the neutralizer in the production process and the amount of anti-copperheading frit used in the ground coat was successfully reduced from 50% to 25%.

Later, nickel treatment was added to the production pickle process and it was necessary to return to the use of 50% anti-copperheading frit as copperheading reappeared. It was believed that the copperheading resulted from the extension of the process rather than the presence of nickel as the surface of the metal was of yellow-green color and covered with a black smudge which proved to be largely iron. Experimental addition

W. H. Pfeiffer finishfoto

of reducing agents or tartaric acid, which readily dissolves iron salts, after the acid pickle improved the color and by analagous behavior is believed to be the cause of irregular or chromic cleaning difficulties in the production process. A number of cases were cited in evidence.

A few drawing compounds were found which did not exhibit this behavior but a majority did. No alkaline cleaner was found which would clean the offending drawing compounds. The use of one of the unoffending drawing compounds would probably be the simplest remedy but storing the parts so that they would not trap moisture, or drying or cleaning the parts just after the die operations would probably avoid the condition. The use of a solvent before cleaning would be effective in assuring perfect cleaning but has other objections. The use of an emulsion cleaner preceding the alkaline cleaner looked attractive but was not effective or else actually soiled clean panels so that they would not clean.

The test method described should be valuable in the development of new drawing compounds and new cleaning methods.

An obstacle in the cleaning of drawing compounds from enameling iron

By W. H. Pfeiffer and V. A. Williamitis

The testing of drawing compounds to predict how successfully they could be cleaned by alkaline cleaners when used in the production process has never been very successful. In this work it was found that when test panels of enameling iron were coated with drawing compound and stacked one on the other, for a week, like the pages of a closed book, the surfaces which were exposed to the air were cleaned readily but those not exposed to the air could not be cleaned free from water-break in alkaline cleaner. Further, it was found that those surfaces which were not cleaned could be treated with organic solvents and then cleaned readily.

The drawing compound on the surfaces exposed to air dried and retained its color but on the inside surfaces the drawing compound was still moist and was discolored to the yellow or green. This suggested that the enameling iron had been corroded by the presence of the moisture and that iron soaps may have formed by reaction with the fatty acids of the drawing compound as they are insoluble in water, alkalis and weak acids but are soluble in organic solvents. This proposal was believed to be true and reduced the copperheading in the test ground coat. This suggested that the ferrous sulfate from the sulfuric acid pickle was being hydrolized or oxidized and reference to the literature confirms that this occurs readily in the presence of air when the solution is dilute and particularly when the solution is neutral or alkaline. Consequently, the process was changed to acidify the acid rinse to 3 pH, to remove a spray rinse which followed the acid rinse, to acidify the nickel solution to 3 pH. to remove an acidic rinse just after the nickel solution and to substitute caustic soda for the borax and soda ash which had been used in the cyanide neutralizer.

These changes produced an iron surface which was relatively free from the color of the iron salts and which did not cause copperheading in the test ground coat. The anti-copperheading frit in the production

enamel was again reduced from 50% to 25% and no copperheading from this cause has been experienced since.

These procedures may not be sufficiently effective for the application of white enamel directly to the iron and some suggestions were made for further study to gain more effectiveness.

Product quality standards in the porcelain enamel industry

By G. H. Spencer-Strong

The need for product quality standards has been recognized in the porcelain enamel industry for many years. Such standards have been arrived at by two general methods: first, through the use of organized, systematic quality control in the manufacturing operation, and second, through the establishment of industry-wide quality standards. In both cases the first requirement is suitable test methods, since obviously it is not possible to set up standards of quality without some method of determining whether these standards are being met. In the establishment of industry-wide standards a second requirement, that of intelligent quality limits, is required.

During the past ten years the porcelain enamel industry has made great strides in the development of suitable product quality standards. Two organizations within the industry, the Porcelain Enamel Institute and the National Council of Holloware Manufacturers, have set up research organizations for the purpose of developing standard tests for products. As these tests have been produced and brought into general use, it has also been possible to arrive at suitable quality standards. In 1939 there was in existence in the enameling industry only one industry-wide quality standard, that of the dry process sanitaryware industry. At the present time no less than fifteen types of enamel products are covered by some type of industry-wide standard. Of these, three are commercial standards arrived at in cooperation with the National Bureau of Standards in Washington; one is an industry-wide standard prepared by an association of manufacturers with the cooperation of the Bureau of Standards; and the remainder are standards which have been prepared by the Porcelain Enamel Institute in cooperation with the interested branch of the industry for the guidance of both the enameler and the consumer. In addition to these fifteen standards there are a number of standards which have been prepared for special items by the federal government in cooperation with the industry.

Existing standards cover base metal, including composition and thickness, design and fabrication, finish, reflectance, color, enamel thickness, enamel adherence, heat resistance where required, flatness, freedom from warping where required, and in some cases hardness or abrasion. In most cases the existing specifications set minimum standards only. However, there are a few cases wherein both maximum and minimum standards have been established. Experience has shown that the use of the minimum standard gives greatest satisfaction in the porcelain enamel industry since it does not handicap the producer and limit the improvement of materials. In general, the industry has been in unusually close agreement, in view of its widespread nature, on minimum quality limits.

A comparison of the latest quality standards with those prepared in the years 1940 and 1941 shows that the industry is willing to take advantage of technological improvement and to tighten up their specifications when it is possible to do so. Thus, for example, in the matter of enamel thickness the maximum allowable coating thickness has decreased approximately 20 per cent in the past five years, indicating the willingness of the manufacturer to improve his product and to stand back of it. Similarly, in the matter of acid resistance, the greater part of the industry actually demands and delivers materials of grades superior to those called for by existing quality standards.

In general, industry-wide standards or suggested standards are now available for the majority of porcelain enameled articles. Although a few additional standard tests would be desirable, enough basic tests are now available to make possible the formulation of acceptable specifications for porcelain enamel surfaces in general. Continued cooperation in the development and utilization of minimum quality standards on an industry-wide scale should be of great benefit to the industry as a whole.

Factors affecting orange peel

By John J. Steencken

In this investigation, purely mechanical and controllable factors were considered for their effect on the spraying operation. The human element was eliminated by the use of automatic spray and conveyor equipment. The factors considered were the type of fluid nozzle, type of air cap, atomizing pressure, the rate of flow of the enamel through the spray gun, spraying distance, angle of incident of the spray, application weight, specific gravity, viscosity of the enamel slip, and mill additions.

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For the investigation a zirconium-type frit was used with a basic formula similar to that used in plant practice. Standard conditions were set up and maintained; that is, to study the effect of each individual factor, all others being held constant.

It was found that most of the above factors affected the smoothness of the spray to a considerable degree. Varying any one could change a good spray into a poor one. The type of air cap used had the biggest effect on orange peeling. There was a definite correlation between the rate of fluid flow and the rate of flow of the atomizing air to give best results. In other words, a given volume of enamel slip required a definite volume of atomizing air to achieve proper atomization. The air consumption of the various caps determined whether the proper amount of atomizing air was supplied to give a smooth spray.

The rate of flow of the enamel through the spray gun also had a big effect upon orange peeling. The rate of flow was determined by shutting off the atomizing air and taking the time for 100 c.c. of enamel to flow through the gun under tank pressure. When the rate of flow was too fast for proper atomization, orange peeling resulted. When the rate was very slow, a dry, rough surface was obtained which did not contain sufficient moisture to smooth out properly. A rate of flow of 10-12 sec. per 100 c.c. gave good results.

Atomizing pressure, spraying distance, shape of fan, angle of incident, and application weight also had a definite effect upon the orange peeling tendencies of the spray. The mill additions did not have too great an effect upon orange peeling as long as the proper specific gravity and viscosity of the enamel slip was maintained.

Several points of control were recommended to reduce the effect of the mechanical factors to a minimum. These were: (1) the specific gravity of the enamel, (2) viscosity, or pick-up, of the enamel slip, (3) determine by experiment the fluid nozzle and air cap most suitable to the required job, (4) control the rate of flow of the enamel through the spray gun (guns may be purchased with special fluid and fan control attachments which can be operated only by a master key) and (5) insofar as possible maintain the proper spray weight. The importance of maintaining uniform spraying conditions from day to day with well conditioned equipment and close control was stressed.

Development of tests for porcelain enamel: Available tests

By W. N. Harrison

The factors involved in the development and promulgation of standard tests for enamels and enameled articles, as well as the need for and acceptance of such tests, are discussed. The relation between true standard tests which can be performed with the precision required of umpire tests on the one hand, and shop or routine control tests on the other, is described. A summary is given of the tests now available and those for which a need has been suggested. Expression of opinion regarding the revision of existing tests and the development of new ones is invited prior to closing the paper.

Beneficiation of reclaim cover coat enamels

By B. J. Sweo, D. W. Scott and L. A. Roe

The current practices of utilization of reclaim cover coat enamels leave much to be desired. In view of current methods of utilization, in relation to the quality of ware produced by such methods, it would appear desirable to discard all cover coat reclaim. However, when it is considered that an estimated fifty per cent of enamel sprayed is collected as reclaim the cost to the enameling industry is staggering. To a producer of porcelain enamel ware, the additional cost of manufacturing an item because of spray loss may be the determining factor between finishing with porcelain enamel or with a competitive finish. The solution of the reclaim cover coat problem, therefore, would be an important step in advancing porcelain enamel finishes competitively.

A study was made with a view toward arriving at a practical means of removing defect producing contaminants from the reclaim cover coat enamel. The investigation consisted of:

1. Examination of reclaim cover coat enamel to determine the nature of the defect producing contaminants.
2. Determination of the particle size ranges within which the defect producing contaminants occurred.
3. Effecting a means of removal of contaminants.
4. Removal of the contaminants on a semi-commercial or pilot plant scale.

Two sources of reclaim cover coat were studied; namely, spray booth scrapings, referred to as booth reclaim, and reclaim collected in a dust collection system in connection with the spray booth from which the scrapings were collected. This latter source is referred to as flue reclaim. The study procedure consisted of fractioniting reclaim into seven particle size ranges by means of a Houltain Infrasizer. Samples from each particle size range were milled and tested as cover coat finishes and evaluated for cleanliness. It was found that the greater part of the contaminating material was concentrated in the large particle size fractions. Removal of large particle size fractions provided a quite acceptable product from the standpoint of cleanliness, but due to an increase in clay content the resulting enamel did not fire out properly. *(The increase in clay content resulted from removal of frit as coarse fractions.)* It was indicated, therefore, that clay removal was necessary to the extent that satisfactory firing properties would be obtained.

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NEWS

Pressed Metal Institute Officers

Election of Clarence W. Custer, American Stamping Company, as president of the Pressed Metal Institute was announced at the annual meeting of the Board of Trustees held in Cleveland. Other newly elected officers include: Carter C. Higgins, vice president of Worcester Pressed Steel, as vice president; J. J. Boehm, president of Boehm Steel Co., as secretary-treasurer; and Tom J. Smith, Jr., as executive vice president.

Following the election of officers, reports were made by committee chairmen and a program of Institute activities for the coming year was presented.

Norge purchases fifth factory for producing appliances

Howard E. Blood, president of the Norge Division of Borg-Warner Corp., announced completion of negotiations for the purchase of the Air Products, Inc., Chattanooga, Tenn. plant, and transfer of title from the War Assets Administration.

This brings to a total of five the number of factories to be devoted to the exclusive production of the Norge line of household appliances.

The new plant will be employed for the production of a new type hermetic compressor unit to be used in household and commercial refrigerating devices, according to Mr. Blood.

Grierson to Clyde Porcelain

Appointment of A. R. (Andy) Grierson as assistant to the president has been announced by directors of Clyde Porcelain Steel Corp., Clyde, Ohio.

Mr. Grierson will serve as assistant to R. R. Trubey in the latter's capacities as president of both Clyde Porcelain Steel and Baltimore Porcelain Steel Corp., Baltimore, Md., and as chairman of the board of Artkraft Manufacturing Corp., Lima, Ohio.

Native of Scotland, Grierson has been an engineer since 1912 and has had a wide and varied experience. He has served in various capacities at Ford Motor Co., Nash-Kelvinator Corp., and Norge Division of Borg-Warner Corp. For the past two years he has been assistant factory manager for Bendix Home Appliances, Inc., South Bend, Ind.

While at Norge, he was superintendent of welding, press room, metal finish and burner divisions, later becoming plant engineer. At Bendix, his responsibilities included tooling and plant layout.

In his new position, Mr. Grierson will be in direct charge of operations at the Clyde Corporation's two plants in Clyde and at present is reported to be concentrating his attention on the rebuilding program, made necessary by a costly fire last November, and post-war expansion of operations. He will also spend some time at the Lima and Baltimore plants, both of which are reconverting from war production and entering new fields of manufacture.

Tennessee Enamel strike settled

On April 7, approximately 400 employees voted to return to work at the Tennessee Enamel Manufacturing Co., Nashville, after being out on strike since January 14.

Substantial wage increases were granted to hourly and piece-rate workers. Increases will vary according to the workers' classifications and will be retroactive to April 7 when finally approved by NLRB.

Dave Noland organizes new company

D. B. (Dave) Noland, formerly factory manager and director of Gray and Dudley Company, Nashville, Tenn., has organized and is president of a new corporation, Noland Tank & Galvanizing Company, Nashville.

The company is now in production on electric hot water heater tanks in a new brick and steel factory building erected by Noland and leased to the corporation on a long-term basis.

Noland continues on the Board of Directors at Gray and Dudley, and is president of Graining Equipment Company.

Inauguration of Ferro Chemical Corporation

Effective April 1, 1946, the Ferro Drier & Chemical Company and W. B. Lawson, Inc. — both subsidiaries of Ferro Enamel Corporation — were merged into one company, the Ferro Chemical Corporation. Executive and sales headquarters will be retained in the Union Commerce Building, Cleveland, Ohio, and manufacturing will continue in the drier and chemical plant at Bedford, Ohio. W. B. Lawson, president of the two constituent organizations, will con-

tinue as president of the new company.

The Drier Division of the new company will continue its regular lines with plans for future expansion to include other industrial chemical specialties. Branch offices, formerly of W. B. Lawson, Inc., are maintained in St. Louis, New York, and Detroit and additional ones are to be established in certain centers of industrial activity to serve the ceramic, steel, insecticide compound, cleaning mixtures and various other industries.

A.C.S. Chicago Section elects new officers

Dr. Cook finishfoto

Over forty members and friends of the Chicago Section attended the April 12 meeting held at the Electric Club rooms, Civic Opera Building, Chicago. Among the out-of-town visitors were Mr. & Mrs. Peralita, Mexico City, D.F., who operate a ceramic plant in the Mexican capital. At this last meeting of the season, an election of officers for the coming year 1946-1947 was held. The following persons were nominated and elected:

Chairman — Dr. Ralph L. Cook, University of Illinois.

Vice Chairman — W. S. Debenham, Carnegie-Illinois Steel Co.

Secretary-Treasurer — J. J. Svec, Industrial Publications.

Councillor — Professor A. I. Andrews, University of Illinois.

The program included a talk by E. A. Wendell, Link-Belt Company, and a sound movie, "Plain Facts About Glass," presented by representatives of Libbey - Owens - Ford Glass Company.

Fowler employee participation plan

Paul L. Fowler, president and founder of the Fowler Manufacturing Company, Portland, Oregon, has announced the recent inauguration of an employee participation plan. A fund has been established to which the company contributes for each water heater and porcelain range boiler produced. Deductions are made from the fund for each unit that the company must replace without charge, thusly creating a monetary interest in craftsmanship, as well as production.

At the year's end the remaining fund is distributed to the employees on a percentage of payroll basis. Thruout the year weekly reports of production results, additions to the funds, and its payroll percentage are publicized to maintain employee interest. Deductions are never made from the employees wage as the participation fund operates solely as an "above wage" earning.

The American Washer and Ironer Manufacturers Association has announced the moving of its headquarters from 111 W. Washington St. to the First National Bank Building, Chicago. The telephone number, State 8115, remains the same, added Allyn H. Noelke, executive secretary.

Stokes resigns at Clyde

A report from Thornton E. Stokes, executive vice president, sales manager and a director of Clyde Porcelain Steel Corporation, states that he has resigned as an officer of the Corporation effective June 1, but that he will continue to serve as a member of the Board of Directors.

Stokes acquired substantial stock interests in the Clyde company in 1938, and joined the organization in April of that year. For some years before that he was manager of the marketing division of Youngstown Pressed Steel Company, and prior to that was sales promotion manager of Continental Steel Corporation.

On leave of absence during the war, he headed the National Steel Recovery Program of the War Production Board with national offices in Pittsburgh. That agency was charged with the responsibility of locating and channeling into war production all types of steel inventories which were idle. Following the liquidation of the agency at the end of 1943, he returned to his position with the Clyde company.

Current plans call for a move to Westchester County, New York (suburban N.Y.C.), about August 1.

Traffic manager at Eljer

The Eljer Co., Ford, Pa., has announced the appointment of William M. Griffin as traffic manager for the Company's home office. Griffin, it is reported, brings over twenty years experience in railroad traffic work to his new position.

New McCray vice president

finishfoto

Management of McCray Refrigerator Company has announced the election of V. C. Knight to the position of vice president in charge of operations. This position includes the responsibility for all factory and engineering operations.

Knight joined the McCray organization in 1925 as a clerk and correspondent. For several years after that he was with the field selling organization, first as distributor and later

as district sales manager in the southern territory. In 1941 he was appointed chief engineer, and for the past few years he has also been serving as factory manager.

The report states that the present expansion and modernization program being carried out at the McCray factory under Mr. Knight's supervision will be completed in the near future.

Staff addition at BCR

Bituminous Coal Research, Inc., has announced the addition of Carl S. Westerberg to its Pittsburgh staff. Westerberg will be responsible for the agency's Bituminous Coal Research bulletin and technical information service. Following graduation as a B.S. (Chemistry) from Knox College, '31, Westerberg served five years with the Illinois State Geological Survey, and five years with the Utah Fuel Company successively as coal research engineer and project manager. Prior to his present assignment he was engaged in sales work in St. Louis, Mo.

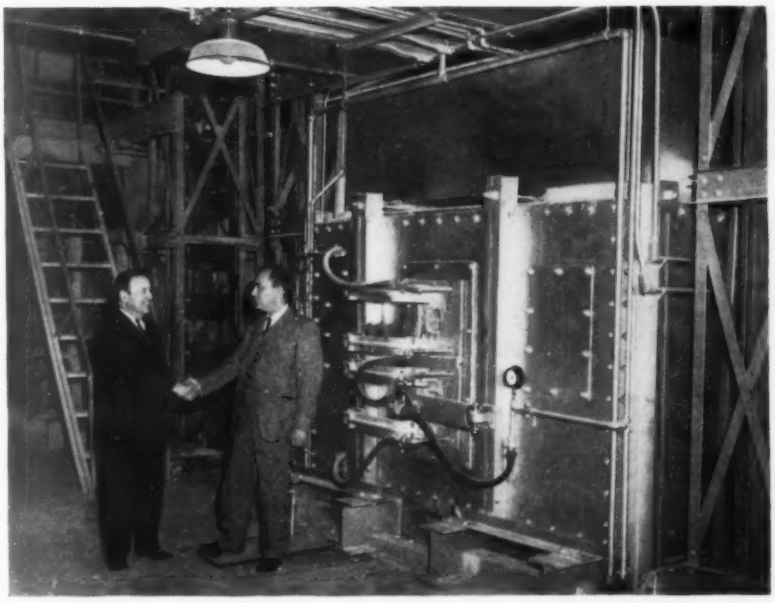
Moore Enameling promotes E. F. Stahl

Formerly sales manager of The Moore Enameling & Manufacturing Company, E. F. Stahl has recently been promoted to the position of vice president in charge of sales. Prior to August, 1945, Stahl was associated with the Lyon Metal Products, Aurora, Illinois in a sales capacity. Moore Enameling, located in West Lafayette, Ohio, manufactures and markets porcelain enameled cooking utensils.

Industrial designer receives award

The Naval Ordnance Development Award has been conferred upon the New York and Los Angeles Staffs of Walter Dorwin Teague. The special skills and techniques developed by these staffs thru their years of work in industrial design adapted to the Navy's problems resulted in the award. The organization is again devoting its attention largely to industrial design requirements for civilian industry.

Pemco announces completion of 5th continuous smelter



Richard Turk (right), executive vice president of Pemco Corporation, congratulates H. G. Wolfram, vice president and works manager, on completion of Pemco's fifth and newest wholly continuous smelter. Executives state that this new addition, along with improvements which have been made on the four continuous units now in operation, is expected to increase the capacity of the plant more than 50 per cent.

Survey of today's shortages

Results of a nation-wide survey on present-day shortages of wheat, sugar, fats and oils which is being made currently by the Home Makers Guild of America will be revealed at the convention of the American Home Economics association at Cleveland June 24 to 27.

Data on the survey which is being made for Owens-Illinois Glass Company will be available at the glass company's booth.

New ad man at Ingersoll Steel

Roland D. Doane, general sales manager of Ingersoll Steel Division, Borg-Warner Corporation, has announced the appointment of Lynn A. Saylor as advertising manager. Saylor spent twelve years in advertising and promotion for Edison G.E. Appliance Co., three years with Certain-teed Products Corp., and has also been with Clarion Radio and Montgomery Ward.

G-E strike production loss

The strike at the G-E plants delayed an estimated 192,000 irons, 67,000 refrigerators and 18,000 washers. These were the figures given to the sales conference of the Edison Electric Institute by Robert S. Peare, vice president of GE, who based his

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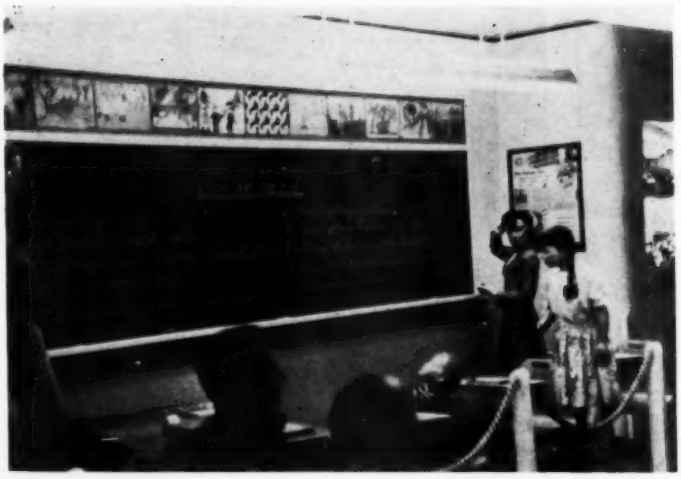
Above: Visitors in the Mitchell Manufacturing Co. exhibit at the International Lighting Exposition.

Above: Revere Electric Mfg. Company exhibits a variety of designs in porcelain enameled reflectors.



Below: D. E. Worrell and W. M. Phillips of Quadrangle Mfg. Co. with N. Newman of West Philadelphia Electric.

Below: R. D. Bradley, sales manager for Daybrite Lighting points to a porcelain enameled fluorescent reflector.

Above: Realistic schoolroom exhibit in the booth of Curtis Lighting, Inc.

Lower left: Fred P. Walter and K. A. Sawin of Wheeler Reflector with C. E. Butler of Butler Electric Co.

Lower right: W. L. Brandel is shown in the Jones Metal Products Co. booth with a variety of porcelain enameled reflectors.

finishfotos

First international lighting exposition

and conference — a big success

OFFICIAL tabulation of attendance revealed that over 9,000 persons attended the International Lighting Exposition and Conference held April 25-30. Those in attendance were from all over the United States, Canada, Mexico, Cuba and other foreign lands. According to E. C. Huerkamp, Westinghouse Lamp Division, chairman of the Exposition, "The success of the Exposition and Conference was so overwhelmingly conclusive that plans are already under way for the 2nd International Lighting Exposition and Conference which has been set by the Exposition Operating Committee for Chicago at the Stevens Hotel November 3-7, 1947."

In commenting on the attendance, R. W. Staud, Benjamin Electric Mfg. Company, chairman of the Program, Publicity and Attendance Committees, pointed out: "The aim of this Exposition and Conference was to provide an exhibition of lighting equipment and a conference program of real interest and value to the man or woman engaged in the specification, manufacture, sale, installation and use of lighting equipment. It is gratifying to the committee that the official attendance statistics indicate that this objective was accomplished.

"This tab shows that over 9,000 electrical wholesalers, electrical contractors, utility personnel, architects, engineers, industrial and commercial executives, and others attended. While we anticipated the Conference program and lighting forums would be well received, the Committee was unprepared for the tremendous crowds which turned out for these sessions and its apologies are sincerely extended to those who were unable to gain admittance at these sessions. This interest is gratifying to all who are interested in the advancement of lighting as it can not be construed otherwise than as a significant portent of a boom in the re-lighting of America program."

The committee's decision to hold another Exposition and Conference next year is said to have resulted from a universal demand developed during the Exposition. Members of the Exposition Operating committee were: E. C. Huerkamp, Chairman; A. A. Overbagh, Overbagh & Ayers Mfg. Co.; S. R. Naysmith, The Miller Company; F. I. Wilson, F. W. Wakefield Brass Co.; W. P. Lowell, Jr., Sylvania Electric Products, Inc.; F. J. Martin, National Electric Manufacturers Association; D. J. Biller, Day-Brite Lighting, Inc.; and R. W. Staud.

Porcelain enameled fixtures are exhibited

There were over seventy exhibits in the large exposition hall showing all of the latest in lighting equipment and accessories. Among the exhibits were a number of porcelain enameled units on display. These included the conventional open-type industrial fluorescent reflectors, reflectors for fluorescent type vapor-proof units, outdoor floodlighting reflectors, special airport lights, etc. There were many units on display which *should* have been porcelain enameled but were not. The answer was the same in almost every instance — "We can't get materials."

Lighting an important industry

A great number of papers and talks were presented throughout the Conference by leaders in the fields of manufacture, distribution and public utilities. Some idea of the importance of the lighting business to the distribution group could be heard in the statement of Charles G. Pyle, managing director, National Electric Wholesalers Association, who said: "After all, the lighting business is *big* business in our branch of the industry. It accounts for about 27 per cent of the total electrical supply volume in the United States . . . "

During the lighting industry round table, held in connection with the Exposition, H. H. Green, manager of industry promotion, Lamp Department of General Electric Company, pointed to the following two facts:

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finishfoto

A. K. Gaetjens of G. E., Nela Park with R. W. Staud, Benjamin Electric in the Benjamin booth at the exposition.

→ *from Page 39*

figures on December production. He added that before the strike, production and shipments were good, with 2,300,000 appliances turned out by the end of December.

Enamel displayed at Sesqui-Centennial Show of Cleveland Museum of Art

Edward Winter, with one of five murals from the Cleveland Museum Show.

The Sesqui-Centennial May Show, at The Cleveland Museum of Art, marked the 150th birthday of the City of Cleveland. Included in the many exhibits representing the crafts were a number of entries in enamels, which were reported as outstanding, and remarkable in technical excellence.

Kenneth Francis Bates won a special award for a plate and four small pictures. His technique combines opaque and transluscent colors and foil for brilliance of effect. Doris Hall, said to be a newcomer in the prize list, won first award for four pieces which have a high degree of color sense and an abstract quality in design. H. Edward Winter was given second prize for four pieces, including three bowls and an emerald plaque. Winters' work is credited with tasteful color combinations and a flashing brilliance for effective decorations. Ten pieces won third prize for Charles Bartley Jeffery. Honorable mention went to a group of four pieces by Mildred Watkins.

A trend to the use of enameling for the church is noted.

The jury for the Show consisted of Olin Dows, Rhinebeck, New York, chairman; Charles Nagel, Jr., Brooklyn, N.Y.; and Marianne Willisch, Evanston, Illinois.

New P.A. at Clyde Porcelain

Robert Fredrikson of Big Stone City, S.D., has joined the organization of Clyde Porcelain Steel Corp., Clyde, Ohio, as purchasing agent. Fredrikson entered the Army in February, 1941, as a private and was discharged May 15, 1946, with the rank of major after having served overseas with the 69th and 78th Divisions. He was married March 9 in Spartansburg, S.C., and Mr. and Mrs. Fredrikson are now living in Clyde.

Hi-yo Hommel

The O. Hommel Company came to the rescue of the Pennsylvania Palomino Exhibitors Association, horsemen's organization, to solve an unusual problem. The horsemen were confronted with the difficult problem of determining true color when registering a horse. Many different methods had been tried and discarded. When the problem was presented to the O. Hommel Company the answer proved to be a set of porcelain enameled permanent color plates.

Eastern Enamelers Club to meet June 1

As announced in May *finish*, the final meeting of the season for the Eastern Enamelers Club will be held in Baltimore, Md., on Saturday, June 1. The Southern Hotel will be the scene for the luncheon, entertainment and business meeting.

According to the program committee, enamelers may expect the most informative and entertaining meeting held thus far. Speakers include Dr. J. J. Canfield, American Rolling Mill Co., whose subject is "Enameling Sheets — Past, Present, and Future"; Albert Kellner, export manager of Pemco Corporation, who will describe present conditions in Europe, based on information gained during his two most recent trips; and G. A. Hutt, Ferro Enamel Corp., who will show and narrate a color slide film entitled "Modern Porcelain Enameling." The slide film illustrates methods and equipment being used in leading porcelain enameling shops at the present time.

PEI research fellowship reestablished at Bureau of Standards

R. H. Turk, Pemco Corporation, Baltimore, Md., president of the Porcelain Enamel Institute, has announced the appointment of A. C.

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IF IT'S NEW CONSTRUCTION . . . OR MAINTENANCE

CALL HUYCK

↑ This enameling furnace, now in its 9th year of service, is a representative example of Huyck supervision and expert masonry.

← A typical frit smelter installation by Huyck Construction Company showing smelter under construction.

★ ★ ★ Why do we solicit both new construction work and maintenance? Because in the first place our organization of skilled masons is keyed to the building of structurally sound, long lasting jobs. Second, by taking the responsibility of maintenance, long life and economical operation are assured at minimum upkeep cost.

★ ★ ★ Repeat business — that's our aim, and the fact that we serve the same companies year after year is the best proof of satisfied customers.

★ ★ ★ If you have new construction, rebuilding of furnaces or smelters — maintenance work only — mill lining work — in fact, any work requiring skilled masons — consult with us before placing your next job. Huyck's prices are right. Write, wire or phone —

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ELMWOOD PARK, ILLINOIS

The Washington round-up

By Wilfrid Redmond

THE Civilian Production Administration estimates that it will be at least three weeks after the coal strike is settled before chemicals start to flow to the industries which use them.

The recent steel strike, combined with the curtailed steel production resulting from the coal strike, has brought about a loss of steel equivalent to approximately 90 per cent of the amount required for the entire year's production of refrigerators, washing machines, ranges and other badly needed consumer durables.

Most chemical plants had no more than a 30-day inventory of coal when the strike began. By the middle of April some important companies were down to a 6-day supply and, in general, not more than two weeks' inventory was available throughout the industry.

Production of refrigerators, washers, automobiles, and radios has been delayed because of lost production in the solvent group of chemicals.

The lead picture is darkened by strikes. The fact finding board appointed by the Secretary of Labor has recommended an 18½ cents increase in wages for the strike-bound non-ferrous metal industries, but the companies have been slow to settle on this basis. The industry is waiting for the McFarland amendment to the OPA bill to be passed by the Senate increasing the price ceiling on lead, and OPA is waiting for the industry to come to terms on the wage increase before announcing a price increase. It is understood that OPA is willing to increase the price ceiling on copper from 12 to 14 cents on the basis of a wage settlement of 18½ cents an hour. Senator McFarland is asking OPA for a comparable increase in the price ceiling on lead and zinc.

The petroleum industry has recommended to CPA that the octane rating on premium gasoline be reduced from 80 to 78.5. Government officials said recently that with the country facing a 200,000 ton lead deficit this year, all estimates of lead allocations must be continually revised downward.

The CPA has exempted certain items from the restrictions of the construction control order. Exempted are food warming, dishwashing and food preparation equipment in a restaurant or institution; stoves, washing machines or dryers in a commercial laundry; refrigerators (except where built as an integral part of the building); hospital equipment such as operating tables; and lighting equipment for floodlighting airports, railroads, or other outdoor operations.

Approximately 350,000 dwelling units were authorized for construction with priorities assistance under the veterans' emergency housing program during the period January 15 through April 26, CPA reported. Bath tubs remain a priority item in the Veterans Housing Program and an HH rating applies on this item.

Refrigerators get first industry-wide increase

Manufacturers of household mechanical refrigerators received a ceiling price increase of 8 per cent, effective April 18, and the retail price was increased slightly over four cents on the dollar at the same time. The adjustment is said to reflect all labor and material cost increases allowable under the new wage-price policy. Dealers and distributors are allowed to pass on the exact amount of the manufacturers' increase. This is the first industry-wide increase granted the industry since the end of the war.

Manufacturers' ceiling on washing machines set at 6.8 per cent

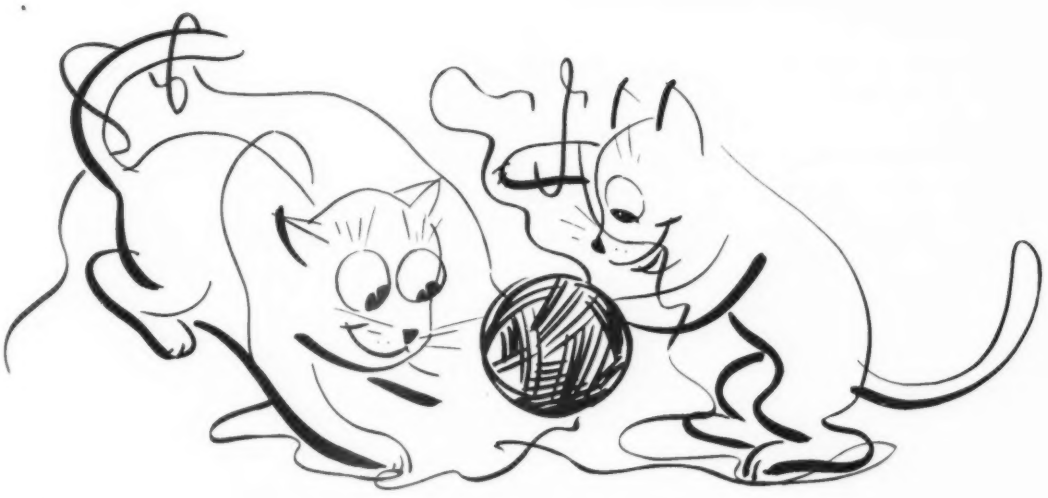
An increase of 6.8 per cent in manufacturers' ceilings on washing machines was granted by OPA, effective April 30. Consumers will pay an average of 1½ per cent more as a result of the action. It will vary from zero to 3 per cent, depending on the type of machine, with the greater increases being allowed on the lower-price models.

Ceiling prices of repair and replacement parts for a number of consumer durable goods that have received reconversion prices are being given the same percentage incerase allowed for the finished article, OPA recently announced. The action covers repair and replacement parts for repriced domestic cooking and heating stoves, domestic washing and ironing machines, and household mechanical refrigerators.

March shipments of porcelain enameled products

The value of shipments of porcelain enameled products for March, 1946, amounted to $4,784,707 as compared with $4,496,464 for February, 1946, the Bureau of the Census reports. Shipments of cooking, household, and hospital utensils amounted to $2,427,013.

The value of shipments of specific products was reported as follows: signs, $348,752 in March — $250,993 in February; stove parts, $542,149 in March — $501,118 in February; refrigerator parts (household and commercial) $253,926 in March — $177,659 in February; reflectors, including fluorescent, $224,431 in March — $271,569 in February; cooking, household, and hospital utensils, $2,427,013 in March — $2,430,276 in February; table tops (kitchen cabinets, dinette sets, breakfast sets), $327,888 in March — $260,447 in February; store fronts and other architectural porcelain parts (exterior and interior), $61,851 in March — $56,060 in February; washing machine parts, $262,059 in March — $260,908 in February; all other, $336,638 in March — $287,434 in February.



GOOD COMPANIONS...

GOOD COMPANIONS — that's what we make of our customers' porcelain enamel products and the colors they ask us to supply. We create colors that "get along" well with porcelain enamel — formulate colors of dependable color strength and uniformity — colors that cut down rejects — that raise production volume and make profits go up.

Of course, it isn't as easy as mere words make it seem, but our technologists go at color problems with a will, and with skill and knowledge that has cracked many a "tough nut" in color application. Whether you need new colors or want old colors duplicated for signs, for products used in architectural construction, for industrial purposes, or for home, professional and institutional utensils and appliances, Drakenfeld has the know-how and the facilities to help you obtain colors that "fill the bill".

Tell us what you are up against. Get the facts about Drakenfeld service on porcelain enamel colors. We feel confident you will be pleased with our cooperation — *and results*. Write today.

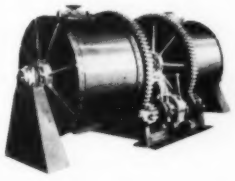
DEPENDABLE SERVICE ON: Screening Paste . . . Graining Colors . . . Squeegee Oils and Mediums . . . Spraying and Banding Mediums . . . Chemicals . . . Rotospray Sifters . . . Porcelain Grinding Balls . . . Porcelain Mill Linings . . . Steveco Mills.

If It Flows ROTOSPRAY Can Strain It!

Saves time and labor. Strains through a vertical screen — no clogging. Long-life screen often saves enough to pay for the equipment. Standard and Junior sizes. May be suspended or placed on floor. Capacity ranges from 300 to 1000 gallons per hour, depending on the nature and specific gravity of the product, screen mesh and size of sifter. Descriptive folder sent on request.

5 SAVINGS WITH STEVECO MILLS

Time
Labor
Horsepower
Floor Space
Initial Costs



Steveco high-efficiency duplex mills wet-grind porcelain enamel materials better, faster, and at low cost. Many outstanding construction features proved in hard day-after-day service in many plants. Wide range of sizes and linings, with all types of drives. Write for catalog, then let us study your grinding needs and recommend the correct type for your requirements.

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B. F. DRAKENFELD & Co., Inc. 45-47 Park Place, New York 7, N. Y.

Factory and Laboratories: **Washington, Pa.**

Pacific Coast Agents: **Braun Corp., Los Angeles 21 . . . Braun-Knecht-Heimann Co., San Francisco 19**

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Francisco to the position as Research Fellow at the National Bureau of Standards.

As a result of this appointment, work at the Bureau will be resumed on the development of standard tests for porcelain enamel. This will be a continuation of research which was carried on at the Bureau for a number of years prior to the war. Earlier fellowships were held by Dr. Paul L. Smith and William W. Coffeen.

Francisco is a graduate in ceramic engineering from Alfred University, and has had post-graduate work at North Carolina State College. He was employed at the Bureau of Standards before entering the Navy for three years' service during the war. He is a member of the American Ceramic Society, junior member of the Institute of Ceramic Engineers, and is affiliated with the Washington Society of Engineers.

Remember the New Name

FERRO CHEMICAL CORPORATION

and New Trade Mark

They're old friends (W. B. Lawson, Inc. and Ferro Drier & Chemical Co.) with the same fine products, merged into one new company—FERRO CHEMICAL CORPORATION.

FERRO CHEMICAL CORPORATION now provides a *single source of supply* for Industrial Chemicals, Metallic Driers and Fungicides—as well as a continuation of the same fine service you have come to expect from the original organizations.

Warehouse stocks in Cleveland, Detroit, St. Louis and (in the case of driers) 15 other cities are retained in this new setup. The same sales agents, too, are available for your convenience in ordering.

Manufacturers:

Driers for Paint and Varnish, Printing Ink, and Allied Industries.

Distributors for:
American Potash & Chemical Co.; Darling & Co.; Duquesne Smelting Corp.; Lindsay Light & Chemical Co.; Merck & Co.; Philadelphia Quartz Co.; Stauffer Chemical Co.; Tennessee Corp.; Virginia Carolina Chemical Corp.; Wyandotte Chemicals Corp.; and others

FERRO CHEMICAL CORPORATION

Subsidiary of Ferro Enamel Corporation

Union Commerce Building **Cleveland 14, Ohio**

Clay Ellinger is superintendent of Philco enameling department

The appointment of H. Clay Ellinger, ceramic engineer with many years of experience in the refrigerator industry, as superintendent of the refrigerator porcelain enameling department has been announced by W. Paul Jones, vice president in charge of the refrigerator division of Philco Corporation.

Ellinger was graduated from Ohio State University in 1932 with the degree of Bachelor of Ceramic Engineering. Shortly after graduation, he joined the Toledo Porcelain Enameled Products Co., Toledo, Ohio, as a ceramic engineer and served in that capacity for eight years.

In 1941 he became general foreman of the porcelain department, Frigidaire Division, General Motors Corporation, Dayton, Ohio, and supervised enameling activities for the five years to May 1, 1946, when he joined the Philco Refrigerator Division. He was a member of the Foremen's Club of Dayton, and became a registered engineer in Ohio.

New responsibilities for Benjamin men

George N. Tuttle, who has been with the Benjamin Electric Manufacturing Company since January, 1941, and who was formerly assistant superintendent in chargee of the enamel shop, was elevated to the position of chief ceramic engineer. He is in complete charge of the enameling department and two important

Start Right with a FIRM FOUNDATION

A FIRM FOUNDATION is just as important to a porcelain enameled metal product as to the home in which you live. The careful buyer of a building wants the facts concerning the structural strength that can not be viewed from the sidewalk. The careful buyer of porcelain enamel finishes wants to know something of the materials that are under the gleaming exterior finish.

Make sure of durability as well as beauty — "start right from the steel out" with Century Ground Coat Frit. Century ground coat enamels develop the tenacious bond between steel and cover coat enamels so necessary to durability and long lasting qualities in the finished product.

Millions of pounds of Century ground coat frit have proved our claims of smooth plant operation, exceptional bonding properties and low operating cost — that's why producers of some of the country's finest porcelain enameled products continue to use this "firm foundation" year after year.

And remember, when you buy frits from Century— ground coat, cover coat, or special frits of any kind — they are all time-proved in production enameling before they are offered to you. Now is the time to "start right" with a Century ground coat trial. Get the frit with the FRIT MASTERS label.

FRIT from CENTURY FRIT MASTERS

CENTURY VITREOUS ENAMEL COMPANY, 6641-61 S. Narragansett Ave., Chicago 38, Ill.

newly created departments — enamel quality control and enamel development.

Russell Hartwig, who has been with Benjamin Electric since February, 1934, and has held various positions in the office and plant, was made general foreman of the enamel shop, with responsibility for production on all three operating shifts.

Preliminary plan for coordinating the activity of all porcelain enamelers clubs

In the report of the first postwar meeting of the Central District Enamelers Club *(February, 1946 finish)*, mention was made of the suggestion that had been presented to *finish* by various porcelain enamel plant men for coordinating the programs of the various clubs.

The early suggestions concerned the advisability of coordinating the activities of the various sectional clubs and the possibility of club officers or representatives meeting at least once a year to discuss such cooperation.

An initial meeting was held in Buffalo, on April 29, at an informal luncheon. The editor of *finish* had been asked to correspond with the three active clubs and request representation for an informal and unofficial get-together. The following report of the meeting was prepared by W. J. Plankenhorn, acting secretary and Chicago Club president, and approved by those in attendance.

Preliminary meeting to discuss the advisability of coordinating the programs of the Porcelain Enamelers Clubs

(acting secretary's report)

In accordance with suggestions made by officers and members of the enamelers clubs, representatives of the three active clubs held a luncheon meeting at the Statler Hotel in Buffalo on Monday, April 29, 1946, during the American Ceramic Society Convention. Those present were R. R. Danielson, of the Eastern Enamelers Club; E. E. Bryant, of the Central Club; F. A. Petersen and O. E. Mulvane, of the Chicago Club, with Dana Chase as acting chairman and W. J. Plankenhorn as acting secretary.

This meeting was for the purpose of discussing the possibility and possible advantages of coordinating the efforts of the three active Enamelers Clubs.

After a thorough discussion of the possibilities by those present, most of whom are at present, or have previously been, officers or committee chairmen for their respective clubs, it was the unanimous opinion of the group that there were definite possibilities for advantageous coordination.

The following were outlined as tentative purposes of the proposed activity:

1. Increase the effectiveness of the groups by coordinating the activity of the individual clubs into a more unified program.

2. Cooperate with the American Ceramic Society and the Porcelain Enamel Institute in obtaining a greater interest among plant men and club members in the programs of these organizations.

3. Assist any group or groups interested in the possibility of organizing enamelers clubs in other districts.

4. Develop a program to assist in the dissemination of available constructive information of interest to enamel plant men.

5. Extend the industry's cooperative activity throughout the entire year in addition to the usual scheduled meetings of the existing organizations.

6. Provide for a continuous flow of information between the participating Enamelers Clubs.

Proposal: It is proposed by the tentative committee that a coordinating committee be appointed for the coming year, to consist of two members from each of the Enamelers Clubs. It is suggested that the first meeting of this committee be held at the time of the next P.E.I. Forum, to be held at the University of Illinois.

It would be the responsibility of this committee to further organization plans to be submitted to the local clubs. Such plans as would be completed at this meeting would then be referred to the individual clubs for their final action.

The presidents of the individual clubs are asked to make tentative appointments of representatives for the proposed meeting, subject, of course, to club approval of the proposed general plan.

Chicago Enamelers Club committee chairmen announced

The appointments of committee chairmen for the Chicago District Enamelers Club have been completed by W. J. Plankenhorn, Club president. The chairmen are as follows:

Program Committee — O. E. Mulvane, A. O. Smith Corporation.

Publicity Committee—E. E. Howe, Chicago Vitreous Enamel Product Co.

Membership Committee — Marcel Pouilly, American Stove Company.

FLASH

A press time communication to *finish* reports that a PACIFIC COAST ENAMELERS CLUB is to be formed. Letters signed by Glen Fulton, Norris Stamping; Walter Bowers, Western Stove; and Richard Carno, O'Keefe & Merritt, have gone out to West Coast enamelers announcing an organization meeting for Friday evening (8:00 pm), June 21, at Morrell's Drive-in, 9854 Long Beach Boulevard (South Gate), Los Angeles, Cal.

Communicate with P.C. Enamelers Club, c/o P. O. Box 68, Station "K," Los Angeles.

More about the PCEC in July finish.

New enamel plant

The founding of the Columbus Porcelain Metals Corp., Columbus, Ohio, has been announced. The new organization is expected to be in production by July 15.

The key men of the new organiza-

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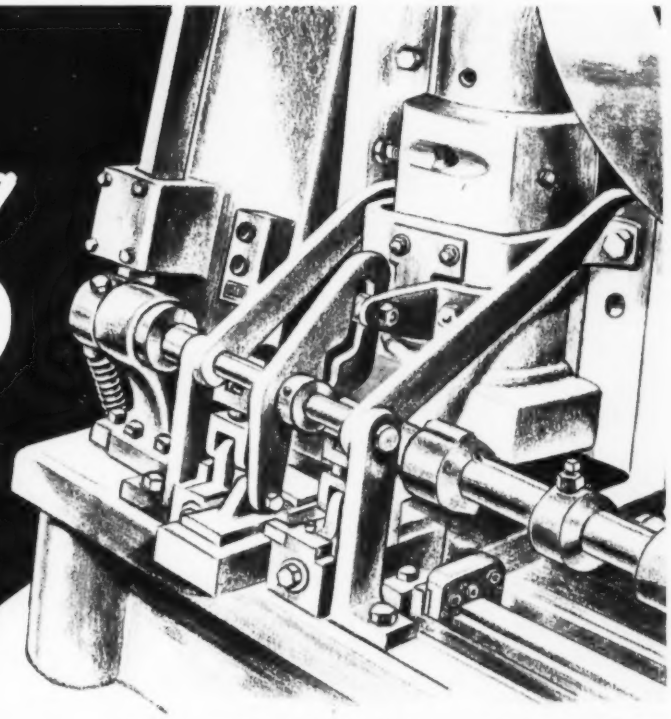
this was a GOOD IDEA



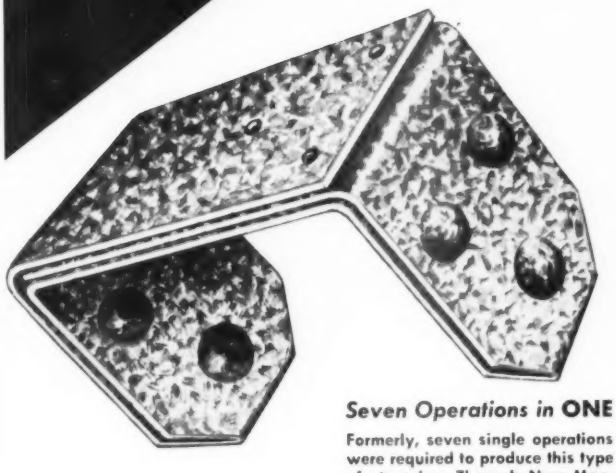
AND IT WENT OVER WITH A BANG

for the Bull Dog Floor Clip Company

This idea—plus precision tooling and fully automatic production facilities designed by New Monarch engineers—made possible the vast and economical production program which has now run into millions of stampings for the Bull Dog company.

This having been a pre-war production set up, prompt delivery on these stampings was possible. If this product were to go through our engineering department today, it would be a long time before any such production could be reached—or even started.

Why? Because, next to material shortage, die making is reconversion's No. 1 bottle-neck. Most die shops are booked solid up to six months in advance, ours being no exception. This is why we urge you to get your die progrom under way immediately. By the time your dies are ready, processing materials, we hope, will be easier to obtain.



***Seven Operations in* ONE**

Formerly, seven single operations were required to produce this type of stamping. Through New Monarch engineering skill, these seven were reduced to one.

Our stamping and assembly services are now available if you have the dies and materials for the job.

MONARCH QUALITY

When you think of Stampings, think of

NEW MONARCH MACHINE & STAMPING CO.

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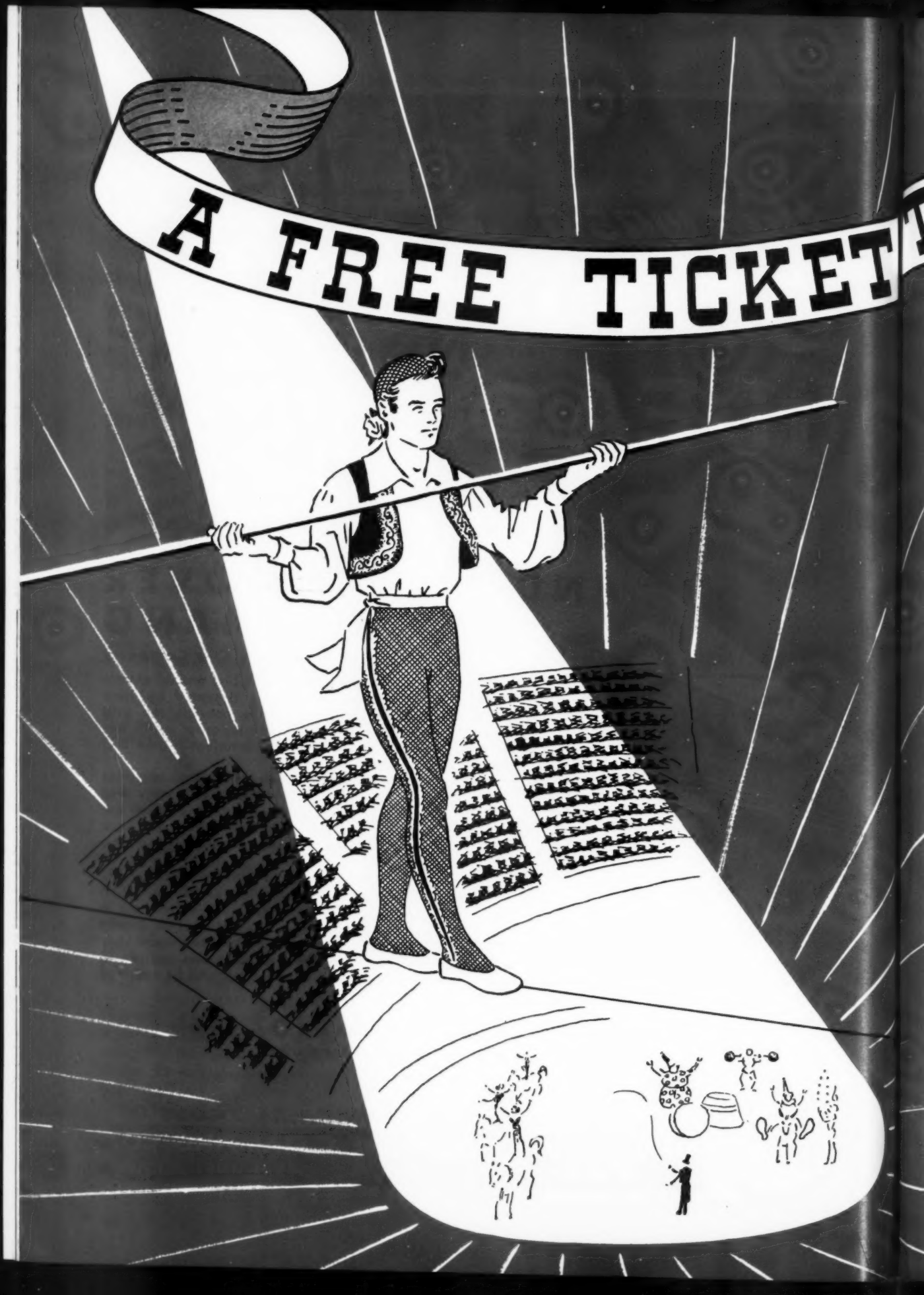

A FREE TICKET

TO THE GREATEST SHOW ON EARTH

To the enameling shop superintendent to whom the finish of the product is a part of his life . . . a demonstration of Pemco products in his plant is the equivalent of a "free ticket to the greatest show on earth."

As the work proceeds, he will see the cumulative experience of hundreds of years of enameling shop practice . . . of years and years of research . . . . focused upon the production of a finish that is the standard for comparisons in the industry.

He will learn a new meaning of the word "service". . . the application of principals that assure greater and more continuous production. He will experience that happy situation that permits brain work instead of brain worry . . . . . He will learn why Pemco is synonymous with Profits. He will learn why Pemco performance is UNIFORM day after day after day.

We shall be glad to arrange a Pemco demonstration... in your plant... at your convenience... with "2133A" for instance. A super opaque zirconium opacified white cover coat with unusual characteristics.

PEMCO CORPORATION

BALTIMORE MARYLAND

"ALWAYS BEGIN WITH A GOOD FINISH"

Dry process enameling practice

(Continued from Page 23)

of having less scarred ware. With excessive handling of the ground coated ware some scuffing of the ground coat bisque is bound to occur which necessitates patching these areas at the furnace.

It has been found that soda ash added as a mill addition in amounts varying from 5-10 per cent will harden up the bisque of the ground coat so that it is not readily scuffed. With such an addition to the mill, it may be necessary to increase or add silica as a mill addition in order that the firing range of the ground coat is not altered to any extent.

Application of powder

Though the actual enameling of the ware is dependent to a great extent upon the skill of the enameler and his helper, nevertheless other factors contribute to the quality of the ware produced. It appears, needless to say, that the furnace in which the ware is fired should be in good order. Muffles should be tight and burners should be checked and cleaned to obtain greatest heating efficiency. The temperature of the furnace should be controlled through proper instruments. Accessories such as bucks, frames and rotating tables should be in first class condition. Periodic checks by maintenance men should be made upon the operating mechanism of the tables and furnace doors in order to eliminate breakdowns.

Dirt, one of the greatest defects found in dry process enameling, can only be reduced through good housecleaning. Sufficient janitor service to keep the floors clean at all times will pay dividends in cleaner ware. A good policy is to have periodic cleaning of all overhead rafters, pipes, etc., especially if any such dirt catchers are directly above the dusting table where vibration may cause this dirt to fall upon the ware. Industrial vacuum cleaners are recommended for cleaning, as they remove dust and dirt more efficiently without spreading it as is the case where sweeping is done.

Consideration should be given to the enameler and his helper in making out the production schedule. Changing of bucks and frames too frequently involves considerable loss of time and production, and it is to the advantage of all concerned to thus arrange the production schedule so that no unnecessary delays are involved.

The ability of the enameler and his helper to work as a team should be considered, especially in the enameling of such ware as tubs and kitchen sinks where the helper is required to assist in the dusting operations. Too often, rejects are quite high on such items and it is often found that some personal difference between the two men is the main reason. A good all around dry process enameler can be truly called an artist, and as such, may be temperamental.

Inspection

While the primary function of inspection may appear to be the selection or sorting out of the defective ware, nevertheless, the information that can be obtained from the inspection records will, if properly kept, indicate many possible ways of reducing the number of defects. By such means, the inspection records can act as a control in the production of better ware.

It is the practice in some plants to have the sprayer who applies the ground coat, and the enameler who enamels the ware, place some identification mark upon the casting so that in case of rejection by the inspection department, definite responsibility can be placed upon the operator responsible for the defect. A daily record of all defective ware is kept for each type of ware produced, and those items that show the greatest number or percentage of rejects should be studied and changes made, if necessary, to reduce the percentage of defects. Inspection records are extremely important, and considerable care should be taken to insure that the forms used are adequate and do contain all the necessary information.

Part III — Enameling defects and suggestions for their reduction

Problems in the porcelain enameled sign field

(Continued from Page 19)

customer wants, offering no over-all counsel and service, that the manufacturer is going to be on a price level basis and be subject to the comparison of dollars and cents only. After all, what else is there for the customer to use as a guide under these circumstances?

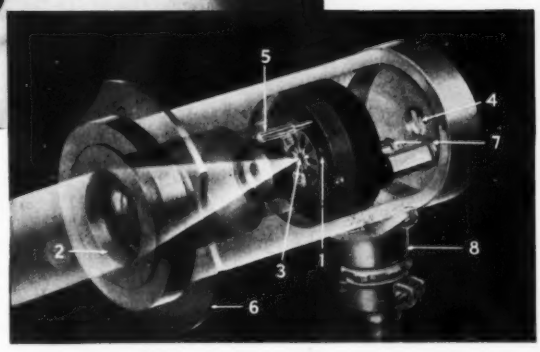
Too many references to the "four letter word"

While I am writing, I want to add one other comment. In porcelain enameling magazines I see frequent references to the word "____" *(See "Just One Little Word,"—The Finish Line — February, 1946, finish)* and it seems to me, as a "downtown coach," that the industry is worrying too much about this matter publicly. Not that breakage should be ignored — definitely the industry should continue to work on that problem in its research program.

I feel that most consumers consider damage in enamel as a result of their own carelessness, excepting when it occurs due to faulty enameling. Like all product improvements, a flaw of this type is brought under control over a period of time. I think damage is most serious when it occurs on enamel that is a part of a complete product as, for example, a refrigerator interior, a stove top, etc.

On a sign it is not so serious as long as the damage is a result of the sign being struck by a hammer or some faulty operation in the installation. After all, plate glass windows are known to be breakable and are handled accordingly. A sign erector who drops a porcelain enameled sign is just being plain careless. I do not believe that the product can ever be made at an economical cost to stand that kind of handling. If an erector is going to beat the sign with a hammer he is simply violating the rules of good installation technique.

to Page 54, Col. 3 →



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Provides these advantages in measurement of temperature from 1000° F. to 3500° F.

Unaffected by Ambient Temperature changes.

Standardized Calibration—as interchangeable as thermocouples.

Eliminates water jacketed construction.

Fastest Response to all temperature changes.

Protected against contaminating dirt and gases.

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Accessory Fittings o sealed construction for all applications.

Thousands of installations in leading industries have proven Brown Radiamatics to be outstandingly rugged, accurate, dependable and economical in the measurement and control of critical temperatures. Installations on Enameling Furnaces and Frit Smelters show it to have the qualities of speed of response and accuracy without which present day standards of surface finish and production output could not be met.

Write for Catalog 5102. THE BROWN INSTRUMENT COMPANY, a division of the Minneapolis-Honeywell Regulator Co., 4411 Wayne Avenue, Philadelphia 44, Pa. Offices in all principal cities. Toronto, Canada — London, England — Stockholm, Sweden — Amsterdam, Holland.

CONSTRUCTIONAL FEATURES

1. *Ambient Temperature Compensating Coil*
2. *Lens*
3. *Thermopile*
4. *Sighting Lens*
5. *Calibration*
6. *Mounting Ring*
7. *Terminals*
8. *Conduit Fitting*

Electronik Recording Potentiometer

Available with Mercury Switch or Air-o-Line control.

BROWN *Electronik* POTENTIOMETERS

Beneficiation of reclaim cover coat enamels

(Continued from Page 36)

Methods of clay removal studied included sedimentation and froth flotation. Evaluation of clay removal was accomplished by staining the removed products with a dye which was absorbed by the clay but not absorbed by the frit, thereby permitting visual differentiation of the removed products. It was found that clay could be more effectively removed by froth flotation than by sedimentation. The removal by flotation was essentially complete.

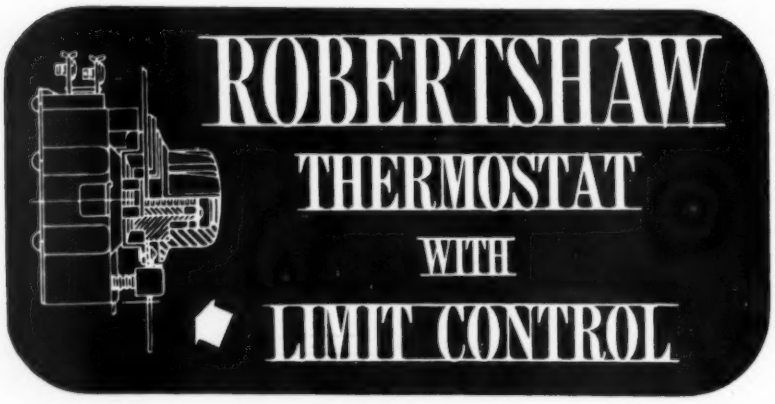
Screening studies indicated that defect producing contaminants could be removed from booth reclaim by screening at 150 mesh. Similarly, it was indicated that defect producing contaminants could be removed from flue reclaim by screening at 200 mesh. Screens of commercial size were devised and operated to determine the practicability of screening at the required mesh size.

A pilot was constructed, to produce a beneficiated reclaim cover coat enamel, consisting of the following steps.

1. Pulping with water to approximately 50% solid.
2. Wet screening.
   a. Booth reclaim at 150 mesh.
   b. Flue reclaim at 200 mesh.
3. Froth flotation.
4. Magnetic separation.
5. Dewatering by filtration.

Production trials of pilot plant processed reclaim were successfully conducted. It was necessary, however, to mill to a fineness approaching one gram residue on a 325 mesh sieve to minimize a minute pinholing effect.

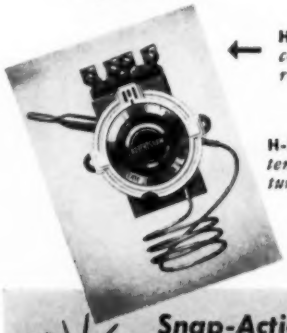
Attempts to isolate and identify the material producing the pin-holing effect have been unsuccessful. The effect was reproduced in the laboratory by procedures which were designed to introduce carbonates of alkaline earth elements in the milled enamel. For example, addition of calcium carbonate, exposure to carbon dioxide, and milling with hard water of high carbonate content.



Model **H1** is a double pole, single throw control using Robertshaw's exclusive "Over-center" snap action mechanism, combined with an auxiliary single pole, single throw switch. In the event of overheating beyond the predetermined safety point through any cause, the switch will automatically cut off all current and lock in an open position until contacts are resumed by pushing in on manually operated re-set button.

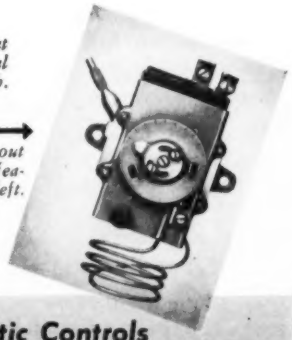
This Robertshaw Electric Thermostat is a sturdy precision instrument. Being very accurate and dependable, it is widely used on sterilizers, autoclaves, incubators, coffee urns, steam tables, deep-fat fryers, etc. It is highly suitable for use with contactors and solenoid valves for air, gas, steam or water.

Write for full information on these and other Robertshaw thermostats for pressure control, oven control, automatic "High-low" switch on parallel hook up, cooking, heating and water heating applications, as well as dual control for low water cut-off and vapor control of temperature.



← **H-1** *Electric Thermostat combined with manual re-set limiting switch.*

H-2 *limiting switch without temperature controlling feature of H-1 shown to left.* →



Snap-Action Thermostatic Controls

ROBERTSHAW THERMOSTAT COMPANY

Youngwood, Penna.

Problems in the sign field

→ *from Page 52*

Other materials have problems of this type, too, and slowly they will overcome them to the degree that the customer is willing to pay for any additional cost involved in overcoming the problems. It is just a matter of a relation between the seriousness of the flaw and the cost of correcting it.

I once heard someone ask a battery manufacturer if he could not make a battery that would last during the life of the car. He said he certainly could, but no car owner would want to pay the price; nor would he want to give up the space in a car that such equipmenut would take.

A paste made of baking soda and water will remove stains from porcelain enameled kitchen utensils.

→ *from Page 48*

tion are Gordon W. Lasiter, president, formerly of Erie Enameling Company, Erie, Pa.; H. C. Scott, vice president; Robert Lewis, plant engineer; and George Zelinski, shop superintendent. These men were formerly with the Co-Operative Enameling Company, of Cleveland.

Atzenhoffer to Gibson

Arthur Atzenhoffer, formerly plant manager for the M. B. Austin Co., North Brook, Illinois, has joined the Gibson Refrigerator Company as superintendent of the range division.

Mr. Atzenhoffer was associated with the Florence Stove Company prior to his connection with the M. B. Austin Co.

Strike at Norge range plant

What was described as an "unauthorized" strike of members of two departments halted production at the Effingham, Ill., Norge (Borg-Warner) range plant. A May 12 report stated that the situation remained unchanged and that there was no chance of an immediate return to work.

Don Mitchell heads Sylvania Electric

Don G. Mitchell has been elected president of Sylvania Electric Products, Inc., succeeding Walter E. Poor, who was elevated to chairman of the board.

OPA decontrol of frit expected

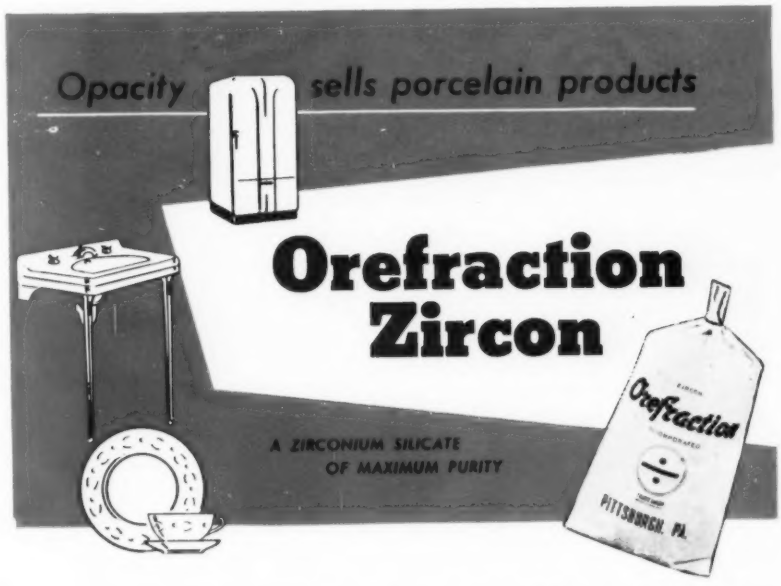
Officials of the PEI are expecting an order freeing enamel frit from OPA ceilings in the immediate future, following the announcement at the Institute's board of trustees meeting in Washington, April 23, that such an order has been recommended to Price Administrator Porter by his Building Materials and Construction Price Branch.

William L. Pringle, head of the Masonry Materials and Refractories Section of the Building Materials Branch, speaking before the board of trustees meeting, said that his organization has been making a study of frit prices, and has recommended their decontrol.

He added that such decontrol would undoubtedly result in price increases, but that without decontrol there prabably would be ceiling increases anyway, and unless the market runs away under suspension of ceilings, the advance probably will not be any greater than that which would be permitted under increased ceilings.

Two new members were elected to the Institute's board of trustees at the Washington meeting — M. J. Salton, Seaporcel Porcelain Metals Corp., Long Island City, N. Y., and Hugh F. McIntyre, Ferro Enameling Co., Oakland, Cal.

The 1946 meeting, it was announced, is to be held at the French Lick Springs Hotel, French Lick, Ind., on Oct. 23-25.



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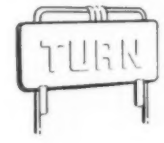

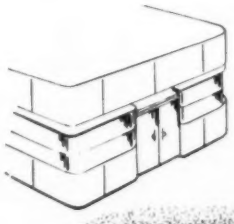

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TRADE MARK U. S. PAT. OFFICE

OREFRACTION RUTILE—*now available for ceramic colorants*

First International Lighting Exposition

(Continued from Page 41)

"(1) *Seeing is the biggest thing in selling, and (2) Lighting is the biggest thing in seeing.*"

We might suggest the addition of the following 3rd point — *The reflecting surface is the biggest thing in lighting.* And, if you want to go a step further, we might offer point 4 — *Porcelain enamel offers the most permanent reflecting surface.*

Importance of maintenance points to porcelain enamel

Throughout the talks and practical discussions, *maintenance* held the spotlight as one of the most important considerations related to lighting reflectors and fixtures. Maintenance, of course, includes keeping the customer's fixtures in good electrical operating condition, the replacement of lamps, starters, ballasts and other parts of the fixture when service is needed, and *cleaning* the fixtures at regular intervals.

Harris Reinhardt, manager of the Commercial Engineering Department, Sylvania Electric Products, Inc., in his talk, "Fluorescent Lighting Maintenance as a Basis for Increasing Sales," said: "This last point — the cleaning of the fixtures at regular intervals — was not included in some of the earlier contracts because of manpower shortage, but experience has confirmed our feeling that there is a real need and demand for this service, and it is now almost universally included.

W. H. Robinson, Jr., advertising manager, Lamp Department of General Electric Company, in his talk, "Developing More and Better Lighting Sales . . . ," stated: "Heretofore, in most small retail establishments, maintenance has been on a catch-as-catch-can basis, with either janitor or handy man, and often the proprietor himself, taking haphazard care of lighting fixtures . . . . With the advent of postwar fluorescent lighting, *planned maintenance* assumes a very important status — not only with the retail store — but with the lighting service man."

The stressing of the maintenance problem should prove a valuable point in favor of greater use of porcelain enamel for lighting reflectors and fixtures. It is the one available material that is not only *easy* to clean but retains its beauty and reflecting qualities after repeated cleaning and years of use. This fact, coupled with the acknowledged importance of maintenance in the lighting field, should give the porcelain enameling industry a growing opportunity to extend its usefulness to the lighting industry.

Porcelain enameled kitchen utensils clean like magic because of the mirror-like finish. So all that need be done is to soak pots and pans in soapy water, and then give them a quick swish with a sudsy cloth.

Standardize

your enamel slips with ILLCO-WAY de-ionized water

Leading ceramic plants are using De-ionized Water in the make-up of enamel slips, thus introducing one more uniform ingredient. Dissolved mineral impurities in all natural waters affect the flocculation characteristics of frit and clay suspensions. *De-ionization* removes the undesirable salts in the make-up water. When De-ionized Water is used in the mill room, *uniformity* of "set" of enamel slip is safeguarded.

Mineral-free water is yours with an ILLCO-WAY De-ionizing Unit. It will produce all the pure water your plant requires for capacity operation at *1% to 10% of the cost of distilled water.* Maintenance is simple — no periodic dismantling for cleaning. Write for literature today.

THE POTTER can better control body and glaze composition with ILLCO-WAY De-ionized Water.

ILLINOIS WATER TREATMENT COMPANY
866-6 Cedar St., Rockford, Illinois
7310-R6 Empire State Bldg., New York City

De-ionizing Unit above: 250 gallons per hour. Other available units have flow rates up to 500,000 gph.

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TESTED IN THE LABORATORY · ILLCO-WAY · PROVED IN THE FIELD

On Their Way To A Winning Finish!

—AND ONLY ONE CAN WIN!

Over the barriers each hurdler is striving to finish first, yet only one can win at the tape. Ing-Rich frits have been over the hurdles — thru the mill — and they can be your winning finish for your complete line of products. 45 years of continued laboratory and plant experience have helped Ing-Rich frits over the enameling hurdles. May we help you to a winning finish for your line of products? Contact us NOW by phone, wire or letter and we will be glad to cooperate. No obligation, of course.

5 cost reduction features

Remember these five practical features of Ing-Rich frits.

1. Lower Mill Batch Cost.
2. Better Adherence Resulting in Less Rejects.
3. A Higher Percentage of One Coats.
4. Wide Burning Ranges, a Savings in Time and Money.
5. Higher Reflectance and a More Uniform Coverage.

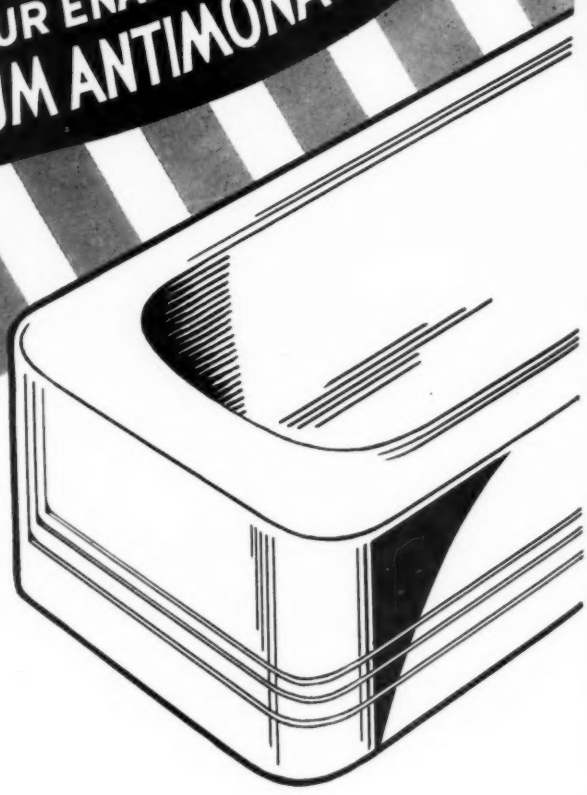
Ingram-Richardson Manufacturing Co.

OF INDIANA — *INCORPORATED*

FRANKFORT — INDIANA

ING-RICH PORCELFRIT "The Plant Tested Frit"

7 features FOR YOUR ENAMELS WITH M&T SODIUM ANTIMONATE



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If you manufacture acid-resistant sheet steel enamels or enamels for cast iron sanitary ware, you'll find Metal & Thermit's Sodium Antimonate the ideal opacifier. Our scientifically controlled methods of production are an assurance of the seven features you want.

Furthermore, the uniform high quality of M&T Sodium Antimonate is available at no extra cost.

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LOW TEMPERATURE CERAMIC COATING

Dip it...

COATED MUFFLERS LAST LONGER...

If You Had Your Choice, Which Muffler Would You Want On Your Next Car?

Certainly! You'd want the Kaykoted muffler for protection against corrosion that can be so disastrous to light gauge metal parts.

Kaykote has high resistance to corrosion resulting from saltcoated streets in winter, it is unaffected by heat and withstands the elements.

Kaykote offers economical protection for all kinds of metal products, from automobile mufflers to coal cars — from gas heaters to ash cans.

If you haven't had samples of the new Kaykote finish, contact us immediately. Or, if your product is not larger than 12″ by 12″ by 48″, send a sample to our laboratory to be Kaykoted.

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